



Mission Fulfillment Committee

December 2021

December 16, 2021

9:15 a.m.

Boardroom, McNamara Alumni Center

MIS - DEC 2021

1. Annual Report on the Status of University Research & Commercialization of Technology

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BOARD OF REGENTS DOCKET ITEM SUMMARY

Mission Fulfillment

December 16, 2021

AGENDA ITEM: Annual Report on the Status of University Research & Commercialization of Technology

Review

Review + Action

Action

Discussion

This is a report required by Board policy.

PRESENTERS: J. Michael Oakes, Interim Vice President for Research

PURPOSE & KEY POINTS

The purpose of this item is delivery and discussion of the Annual Report on the Status of University Research & Commercialization of Technology.

The report's key topics include:

- MPACT 2025 actions, measures, and progress.
- State of the research enterprise.
- Rankings and comparisons.
- Technology commercialization and corporate engagement.
- "Research is teaching."
- The future of university research.

Key messages from the report:

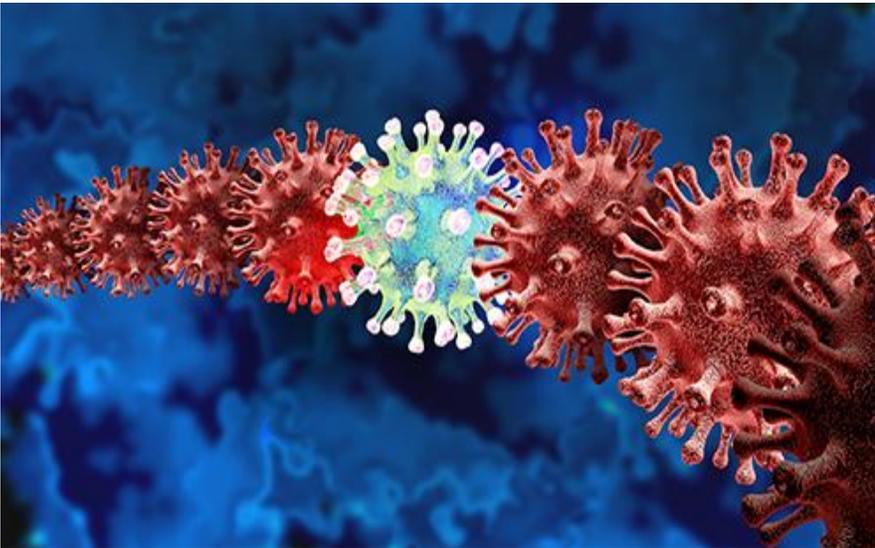
- The University is a leading American research university.
- The research enterprise is strong, growing, and impactful, despite COVID-19.
- Expect modest drop in awards and increase in expenditures.
- Short-term threats are the labor shortage and rising wages.
- Longer-term threat is under-investment in faculty and core services.
- Land Grant University = Problem Solving University.
- Guided by MPact2025.
- Excellence, Integrity, Responsiveness, Impact.
- #Team

BACKGROUND INFORMATION

The following Board policies require the president or delegate to provide an annual report on the status of University research and commercialization of intellectual property: *Commercialization of Intellectual Property Rights* and *Submitting and Accepting Sponsored Projects*.

2021

Annual Report on the Status of University Research and Commercialization of Intellectual Property



J. Michael Oakes

Interim Vice President for Research

12/16/2021

The University of Minnesota’s Vice President for Research provides the University’s Board of Regents an annual report on the Status of University Research and Commercialization of Intellectual Property. Included is the research enterprise’s alignment with the President’s strategic plan, fiscal year and temporal trends in key metrics, comparative rankings and comparisons, and illustrative examples of University research projects. The Vice President also shares her/his strategic priorities and concerns.

The FY2021 annual report includes:

Message from the Vice President for Research	2
MPact 2025 Plan, Measures, and Progress	4
Research Statistics and Outcomes	6
<ul style="list-style-type: none">• Current year totals and comparison with prior year• Year-to-year award funding trends• Research during the pandemic	
National and Global Analysis: R&D Peer Comparison	11
<ul style="list-style-type: none">• Higher Education R&D (HERD) expenditures• Global rankings among public research universities	
Commercialization and Innovation	15
<ul style="list-style-type: none">• Technology Commercialization• Venture Center• Corporate Engagement Center• Strategic Partnerships and Research Collaborative (SPARC)	
OVPR Research Advancement Programs	20
Research Is Teaching	23
Conclusion	24

Message from the Vice President for Research

For nearly 75 years, America's great research universities have been essential contributors to the nation's prosperity, health, and security. Impactful innovations in science and diverse scholarship have led to life-saving vaccines, cell phones, satellites, optimal cattle breeding, electric cars, useful weather predictions, Google, community growth, cultural understanding, and so much more. Silicon Valley, Boston's Route 128, North Carolina's Research Triangle Park, and other place-based innovation districts are directly attributable to research universities. As emphasized by the National Research Council, the advanced education, research, and outreach conducted by research universities is "absolutely essential" for ensuring the prosperity and welfare of people and families in an increasingly competitive knowledge- and innovation-driven economy.

As a member of the prestigious Association of American Universities (AAU) and a designated Carnegie research intensive (R1) university, Minnesota is by all accounts a great American research university. Coupled with its public land-grant mission, the University contributes to the discovery, translation, teaching, and sharing of new knowledge and impactful innovations. The status of, and trends in, its research enterprise is of vital importance to the welfare of Minnesota and beyond.

The University's research achievements during the last fiscal year are a tribute to the ingenuity and resilience of its researchers and all those who support them. In a time when most research operations were paused in response to COVID-19, the University's research enterprise successfully competed for records in total sponsored research awards and the establishment of new startup companies. This is a truly remarkable accomplishment. Research gains in the Medical School and the College of Food, Agricultural, and Natural Resource Sciences are notable. Although record-breaking growth should not be expected every year, prospects for further growth are promising given the anticipated increases in research investment by the University's government and corporate partners.

Thanks to MPact 2025, the University's system-wide strategic plan, and unprecedented collaboration, the research enterprise has clear goals, priorities, and assessment metrics. While action for improved administrative efficiencies is underway, growth *requires* investment in research administration and related support services. Faculty development, doctoral student stipends, expeditious grant and contract processing, and compliance and safety monitoring all merit increased support. The University must ensure appropriate resources are allocated if it aims to sustain its core research mission. Increased investment is necessary if improvements in University ranking and impact metrics are to be realized.

The University has global impact, but is grounded in service to Minnesota. The research enterprise routinely partners with state and local governments to identify key areas of mutual interest while responsibly and transparently stewarding public investments vital to outcomes. What is more, as Minnesota's only major research university, the University uniquely prepares generations of students – undergraduate through doctoral – in research and its associated

innovation impacts. In so doing, the University injects into Minnesota individuals prepared for critical thinking and problem solving, which in turn ensures the prosperity and welfare of Minnesotans in an increasingly competitive knowledge- and innovation-driven economy.

In an era of decreasing trust in major institutions such as higher education, the public is understandably interested in seeing its investment in research translated into positive impacts on people's lives. While we must never lose sight of, or reduce support for, foundational/basic research, the results of which form the basis for translational activities, the University should increase recognition of, and incentives for, applied, translational, and problem-solving research. A land-grant university should be a problem-solving university. This means increased partnerships with corporations, healthcare systems, small businesses, startups, family farmers, and appropriate increases in research in national defense and sustainability.

Guided by its values of Excellence, Integrity, Responsiveness, and Impact, the Office of the Vice President for Research (OVPR) is privileged to support University researchers as they pursue excellence in their scholarly endeavors with an unswerving commitment to research ethics. The OVPR ensures research environments are welcoming, safe, and productive, and that critical equity concerns are embedded in decision making. The next year will see our continued dedication to this effort, as we align our resources to best advance the Systemwide Strategic Plan and thereby ensure the University of Minnesota's status and responsibility as a great American research university.

MPact 2025 Plan: Action Items, Measures, and Progress

The research, discovery, and impact mission of the University provides for the generation, preservation, and translation of knowledge, understanding, and artistry that benefit students, researchers, industry, and communities across the state, the nation, and the world. In addition, we remain ever cognizant of the degree to which the *research and discovery* mission is tightly coupled to the *teaching* and *outreach* missions of the institution as well. It is the *synergies* across our tripartite mission that make us one of the top public research universities in the world.

As part of MPact 2025, the Board has adopted the following goals for Commitment 2, Discovery, Innovation, and Impact:

- Increase high-impact discovery and scholarship
- Drive creativity, collaboration, and entrepreneurial spirit
- Engage Minnesota

These goals, along with others included in Commitment 3, MNtersections, provide a framework for the research community, leadership, and external partners to align with the overall vision of MPact 2025. We assess progress on achievement of this vision and the aforementioned commitments through the measures listed in the MPact 2025 Progress Card. Specific actions and measures, which were baselined and scheduled for updates December 2021, are:

- **Action Item 2.1 Increase year-over-year funding growth for research and industry-sponsored awards.**
 - Target growth for sponsored research awards of 5% per year (stretch 7%) for next 5 years; maintain Top 10 public University expenditure ranking in HERD.
 - Current Baseline: \$876 million sponsored research awards; 10th in public University HERD ranking
 - December 2021 Update: \$1.15 billion sponsored research awards (31.1% increase); maintained Top 10 public R1 University HERD ranking, given COVID
- **Action Item 2.2 Enhance opportunities for new businesses and startups, corporate partnerships, and technology commercialization.**
 - Grow to 25 startups per year by 2025
 - Current Baseline: 19, FY2020
 - December 2021 Update: 20
 - Increase \$ of industry-sponsored awards.
 - Current Baseline: \$81.6 million, FY2020
 - December 2021 Update: \$255.5 million
 - \$140.9 million from NIH-Leidos COVID study

- **Action Item 2.3 Increase state partnership funding.**
 - Increase state-sponsored research
 - Current Baseline: \$412 million (over five years, FY2016-2020)
 - December 2021 Update: \$428.7 million (over five years, FY2017-2021)
 - FY20 to FY21: \$102.5 to \$100.5 million (-\$2 million or -2.0%)

- **Action Item 2.3 Elevate national and international profile and standing while addressing societal needs.**
 - Shanghai ARWU rankings goal: top 35 in world
 - Current Baseline: #40 world, FY2020
 - December 2021 Update: #40 world, #29 US, #9 US public

- **Action Item 3.1 Deepen impact in core areas of strength, including solutions, cures, and technology.**
 - Increase the number of medtech/health-science disclosures year over year.
 - Current Baseline: 239, FY2020
 - December 2021 Update: 209

- **Action Item 3.3 Develop and deploy new techniques and partnerships for smart farming and sustainable food supplies, and natural resources.**
 - Increase the number of food, ag-tech, and natural resource-related disclosures year over year.
 - Current baseline: 33, FY2020
 - December 2021 Update: 29

In summary, the University research enterprise is making strong progress on achieving MPact2025 goals and where there are measures showing a decline it can be attributed to the slowdown of activities during the pandemic months affecting all of FY2021.

There are other progress card goals, actions, and measures included with Commitments 2 and 3 that involve OVPR in partnership with the Provost and Senior Vice President for Finance and Operations. Those include increasing student research opportunities, student employment, and sustainability goals (or SDGs). Where appropriate, we have aligned sections of this report related to those areas back to those goals.

Research Statistics: Fiscal Year 2021

Fiscal year analysis of sponsored research awards

University of Minnesota faculty and staff competed successfully for **\$1.15 billion** in sponsored research awards in FY2021, **up 31.1% from FY2020**. This unprecedented \$272.5 million increase follows a sustained pattern growth since FY2012, and this year's total is a record level of awards in current dollars for the University. The average total amount received per research award also continues to increase from \$167,800 in FY2020 to \$210,900 per award in FY2021, which reflects the University's steady increase in higher-dollar awards received since FY2017. In FY2021, the University received 134 awards greater than \$1 million and these awards accounted for 44% of this year's \$1.15 billion total.

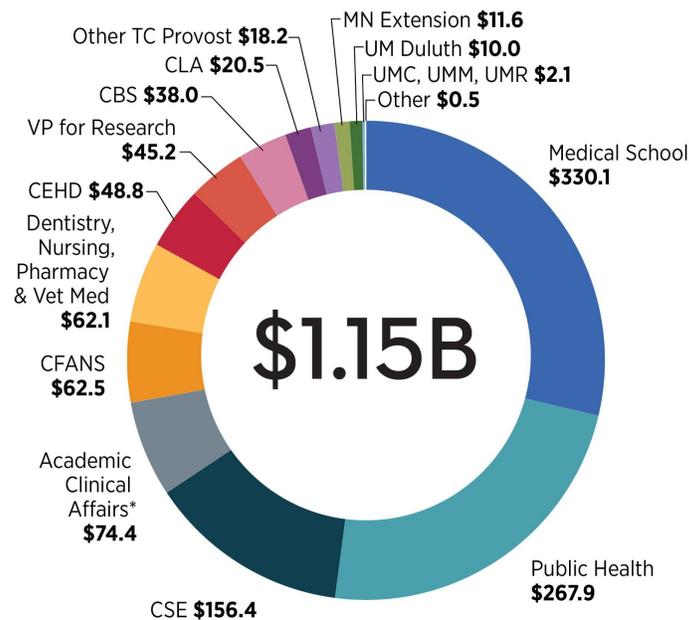
The University receives about half of its research funding (53%) directly from federal sources and the remainder from a variety of non-federal entities. In FY2021, federal awards totaled \$603 million, which was an increase compared to the prior year (\$68 million; 12.7%). Non-federal awards totaled \$545 million, which was an increase compared to the prior year (\$204 million; 60%). Business and Industry (largely due to one very large NIH-funded Leidos pass-through award) was a particular contributor to this uptick in non-federal funding, driven by investments in efforts undertaken to combat the COVID-19 pandemic.

Of the \$603 million in FY2021 Federal research support, the National Institutes of Health (NIH) is the University's largest single federal funding source, totaling \$355.3 million. This amount represents an increase (\$51 million; 16.9%) compared to the previous year. The National Science Foundation (NSF) is the second largest federal sponsor of University research totaling \$82.5 million in FY2021. This was a \$3 million (3.7%) decline from the previous year. Other Federal support is from the US Department of Agriculture (\$45.7 million), the Department of Defense (\$38.0 million), and other agencies.

The \$255.5 million in Business and Industry (B&I) funding was up \$174 million (213.3%) in FY2021 (Table 1). Again, this uptick in B&I funding was driven by the company Leidos and its \$152 million NIH pass-through investment undertaken to combat the COVID-19 pandemic. The total number of B&I awards received by the University increased 3.6% to 1,878 this year compared with 1,812 in FY2020.

State of Minnesota and Local Governments provided \$107.5 million in funding in FY2021, a slight (4.3%) decrease from the year prior (Table 1). The State of Minnesota comprises the majority of this total (\$100.5 million) and as part of this funded over \$44 million in awards related to COVID-19 research, including \$42 million for "University of Minnesota Rapid Wide-Spread Testing for COVID-19 in the State of Minnesota Additional Funding." The decrease this year is attributed to the economic slowdown and delays in receiving funding.

Figure 1: Research Awards by College & Campus (FY2021)



*Dollar amounts in millions
Office of the Vice President for Research Data Services*

Figure 1 (above) illustrates how the University’s \$1.15 billion of sponsored research funding is distributed within the University’s colleges and campuses. This year, those colleges with the largest annual percentage increases in research funding include: the School of Public Health, up \$201.9 million to \$267.9 million (300+%) due to the Leidos contract, the College of Education and Human Development (CEHD), up \$8.9 million to \$48.8 million (22.3%), and the College of Biological Sciences (CBS), up \$5.0 million to \$38 million (15.1%). Funding for the Medical School increased by \$51.9 million from FY2020 to FY2021 primarily due to \$29.8 million more in funding from high-dollar awards. Finally, the College of Science and Engineering increased their funding by \$8.5 million or 5.8%.

Year-to-Year Trends

Table 1 (below) summarizes the year-to-year distribution trend of the University’s sponsored research awards for the years FY2013 to FY2021. As is common with award funding, there is considerable fluctuation that can occur between years caused most commonly by large awards that fund multiple years and delays in federal funding cycle distributions. Over the nine-year period (FY2013-FY2021), the University has generally seen an increasing award trajectory from all categories of research sponsors with the lone exception this year of State funding which can be attributed to award delays.

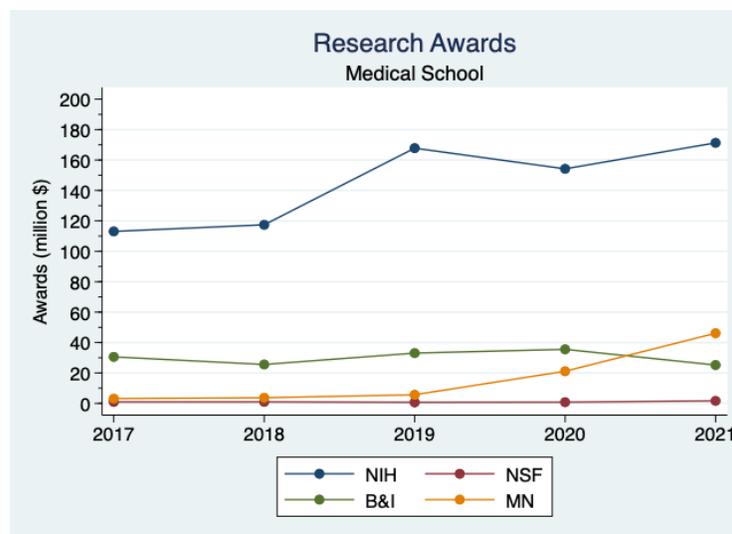
Table 1: Research Awards by Source Category (FY2013-2021)

	Federal	Business & Industry	State & Local	Other Private	Universities & Colleges	TOTAL
2013	\$475.3	\$47.6	\$53.1	\$67.4	\$50.0	\$693.4
2014	\$490.2	\$55.2	\$64.6	\$69.7	\$60.9	\$740.6
2015	\$463.1	\$78.0	\$79.3	\$72.4	\$60.7	\$753.6
2016	\$466.3	\$80.8	\$90.9	\$77.7	\$72.4	\$788.1
2017	\$438.9	\$83.9	\$76.4	\$72.3	\$73.1	\$744.5
2018	\$494.5	\$64.1	\$90.3	\$71.7	\$72.5	\$793.2
2019	\$537.8	\$80.4	\$79.4	\$86.5	\$78.9	\$863.0
2020	\$535.3	\$81.6	\$112.4	\$78.7	\$68.0	\$875.9
2021	\$603.5	\$255.5	\$107.5	\$107.1	\$74.8	\$1,148.4

*Dollar amounts in millions
Office of the Vice President for Research Data Services*

Included in this continued growth trajectory of award funding continues to be increasing numbers of higher-dollar awards (>\$1 million) received by the University. This trend, mentioned previously, is also reflected in the year-to-year increases seen in the University’s average dollar amount received per award, which was \$210,900 in FY2021. There was a 60% growth (84 to 134) in the number of higher-dollar awards coming to the University over the past five years. Growth and variation in awards by school is notable.

Figure 2: Medical School Research Awards by Selected Source and Time

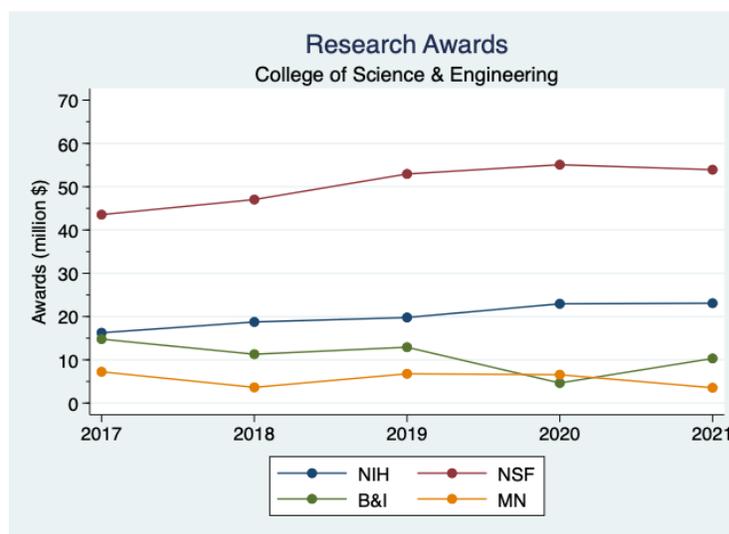


*Dollar amounts in millions
Office of the Vice President for Research Data Services*

Figure 2 (above) shows growth and temporal variation in research awards to the Medical School. The largest source of awards is the National Institutes of Health (NIH); the school's growth in this source is impressive. Business and industry (B&I) awards have been steady, while recently the State of Minnesota provided a bolus of funds for COVID-19 activity. Not surprisingly, the Medical School receives little support from the National Science Foundation (NSF).

Figure 3 (below) shows growth and temporal variation in research awards to the College of Science and Engineering, whose primary sources have been impressively diverse and steady. Note that unlike the Medical School which is primarily supported by NIH, the College of Science and Engineering is primarily supported by NSF.

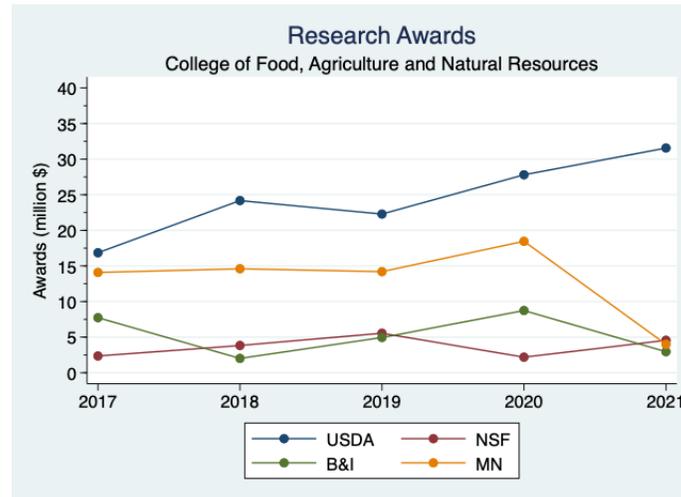
Figure 3: College of Science and Engineering Research Awards by Selected Source and Time



Dollar amounts in millions
Office of the Vice President for Research Data Services

Figure 4 (below) shows growth and temporal variation in research awards to the College of Food, Agricultural, and Natural Resource Sciences (CFANS). This school is primarily supported by the US Department of Agriculture (USDA), and is driving strong growth. The apparent 2021 downturn of support from the State of Minnesota is due to delays in expected allocations. CFANS has modest volatility in its B&I awards.

Figure 4: College of Food, Agricultural, and Natural Resource Sciences Research Awards by Selected Source and Time



*Dollar amounts in millions
Office of the Vice President for Research Data Services*

Diversity in the University’s research portfolio is healthy, and reveals the strategic interest of the federal government in supporting a variety of studies that promote the nation’s prosperity, health, and security.

Research During the Pandemic

As previously stated, the COVID-19 pandemic is having a major impact on the University’s research enterprise. In order to protect all involved, the lion’s share of University research was hibernated, paused, or refocused. This was a herculean effort as a great deal of this work involved the ongoing safety of human and animal research participants and unprecedented contracting dynamics and ambiguity. And this says nothing about the safety and employment concerns of researchers and all those who support them.

Many researchers pivoted and refocused their effort to address new, pandemic-related research projects in early 2020. During FY2021, University researchers received 120 sponsored research awards related to COVID-19 totaling \$256 million. This included \$189.8 million for Coordinating Centers for Biometric Research (CCBR), which was able to quickly and nimbly meet the needs of agencies like the National Institutes of Health and Leidos to test possible COVID-19 treatments in clinical trials across the nation and the globe. CCBR has built a decades-long international reputation for creating high-quality clinical trials that have had major impacts in treating HIV, influenza, Ebola, and many other conditions. Physicians in the University’s Medical School also conducted local trials on a variety of potential COVID-19 therapeutics, and researchers across the University were awarded sponsored funds to conduct research into: racial, gender, and class disparities during the pandemic; the effect of the pandemic on regional food systems; international

contact tracing; novel antibodies from llamas to treat COVID-19; how COVID-19 therapeutics were allocated in Minnesota; and how telecommuting might affect Minnesota's transportation system; among many other topics. Faculty in the School of Public Health assisted with time-sensitive research crucial to policy and practice during this difficult period. Many other researchers from across the system altered plans and adapted to the new environment.

It is abundantly clear that University researchers were highly productive in writing new grant proposals to advance knowledge and innovation impacts during this difficult period. Research administrators and other staff excelled in their efforts to support such work. Among notable efforts was the courage of animal care workers who risked their health to do their job, and the staff of the Human Research Protection Program who quickly and effectively pivoted to 100% online review of essential research to combat the virus.

National and Global Analysis: R&D Peer Comparison

Research Expenditures

With respect to quantifying productivity by money, there is the monetary value of research awards received (discussed above) and the monetary value of research expenditures paid out. The National Science Foundation Higher Education Research and Development (NSF HERD) Survey is the primary source of comparative information on R&D expenditures in US higher education. Expenditures are a measure of institutional research spending activities that are funded through award sources, internal and external, in a given year, and, as such, are retrospective, lagging these award measures by a year or so.

The NSF HERD survey is completed annually by over 900 higher education institutions. While there is no single indicator or composite number that accurately represents the totality of research impact at an individual institution, the HERD survey data do provide a credible, uniform, and nationally-accepted basis for peer comparisons.

In NSF's most recent FY2020 survey, the University posted over \$1.04 billion in research expenditures, a 2.9% increase over FY2019, and maintained its status as a leading public research university (note: the official FY2020 data are pending official release by NSF in April 2022).

Owing to HERD survey reporting requirements imposed by NSF, the University's \$1.04 billion reported in Table 2 (below) represents only research expenditures for the Twin Cities campus. When all UMN campuses are reported together, total systemwide R&D expenditures are 3% larger, at \$1.07 billion, which, given the close clustering of institutions with expenditures just over a billion dollars, would have moved the University up two places in the survey. Additionally, it is worth noting that the HERD survey includes data on all institutions of higher education,

some of which are not technically Carnegie identified research universities. For example, the University of California - San Francisco and University of Texas M.D. Anderson Cancer Center are stand-alone medical schools without undergraduate education programs; they are not direct peer research university competitors. Excluding them from peer-rankings obviously moves the University of Minnesota up two places. Another interesting nuance to the FY2020 HERD expenditure survey concerns research expenditures during pandemic-related research hibernation. Research universities did not equally ramp down research activities and associated expenditures during FY2020. This differential “shut down” clearly impacts expenditures and elevates the ranking of institutions which delayed or mitigated research hibernation. As mentioned above, the University of Minnesota hibernated research early and substantially. This differential explains a (temporary) change in rankings.

Table 2: Top 20 US Public Research Institutions

	HERD (NSF) - 2020*			ARWU (Shanghai) - 2021		
	Public	AAU/R1	Expenditures	World	US	US - Public
Michigan	1	1	1,673,862	26	18	6
UC San Francisco	2		1,651,073	20	16	5
Washington	3	2	1,456,902	19	15	4
UC San Diego	4	3	1,403,735	18	14	3
UCLA	5	4	1,392,941	14	11	2
Wisconsin	6	5	1,363,931	31	21	8
North Carolina	7	6	1,159,725	29	20	7
Texas A&M	8	7	1,130,803	151-200	57-62	32-34
Pittsburgh	9	8	1,105,532	101-150	41-56	22-31
Maryland	10	9	1,103,062	56	30	14
Univ Texas M.D. Anderson Cancer Ctr.	11		1,051,297	67	34	17
Georgia Tech	12	10	1,048,988	101-150	41-56	22-31
Minnesota - Twin Cities	13	11	1,042,382	40	24	9
Penn State	14	12	991,923	101-150	41-56	22-31
Ohio State	15	13	968,260	101-150	41-56	22-31
Florida	16	14	942,223	97	38-39	20
UC Berkeley	17	15	840,000	5	4	1
UC Davis	18	16	816,693	100	40	21
Texas	19	17	797,199	41	25	10
Arizona	20	18	760,975	101-150	41-56	22-31

Dollar amounts represented in thousands

UC - San Francisco and M.D. Anderson Cancer Center are stand-alone medical schools without undergraduate education programs.

In sum, NSF's HERD data make clear that the University remains among an elite group of US public research universities, ranking in the top 2% of colleges and universities reporting in the survey. Provided there is ongoing investment, there is no appreciable concern about the University of Minnesota falling in rank with respect to HERD expenditure data.

Table 2 also reports another widely accepted and cited ranking system, that of the Academic Ranking of World Universities (ARWU) -- sometimes called the Shanghai index. This system relies on a number of indicators that serve as a proxy for accomplishments and strengths relative to the best performing research institutions in the country and the world, respectively. With respect to research, the ARWU relies on the academic impact of peer-reviewed research, number of Nobel laureates on a faculty, and related measures. This additional measure ranks the University as highly competitive and #9 among public research universities.

In this annual report, the University typically includes data from the Center for Measuring University Performance or CMUP because the center has been a reliable source with consistent and transparent methodology. For reasons that are unclear, the Center has not published reports in the past two years, so CMUP data is not included in this annual report.

More direct comparisons with peer and aspirational public research universities shed light on areas of strength and opportunities for growth at the University of Minnesota. Selected due to their close higher-rank in the HERD expenditure data and/or aspirational characteristics, the University of Minnesota's research enterprise may be compared to the University of Michigan, the University of Wisconsin, Pennsylvania State University, the University of Pittsburgh, and the University of North Carolina (Chapel Hill). There are many possible comparisons, of course, the selected five are for illustrative purposes only.

Figure 5 (below) presents total research expenditures over time for the University's five selected comparisons. Apart from the Johns Hopkins University (a private university and not shown), the University of Michigan's research enterprise is recognized as the largest, followed by the University of Wisconsin in the Big 10 or CIC group. Note that expenditures are rising among all five competitors over time. This means that substantial investment and/or innovation is required to rise in HERD rankings.

Figure 5: Total R&D Expenditures at Five Universities over Time

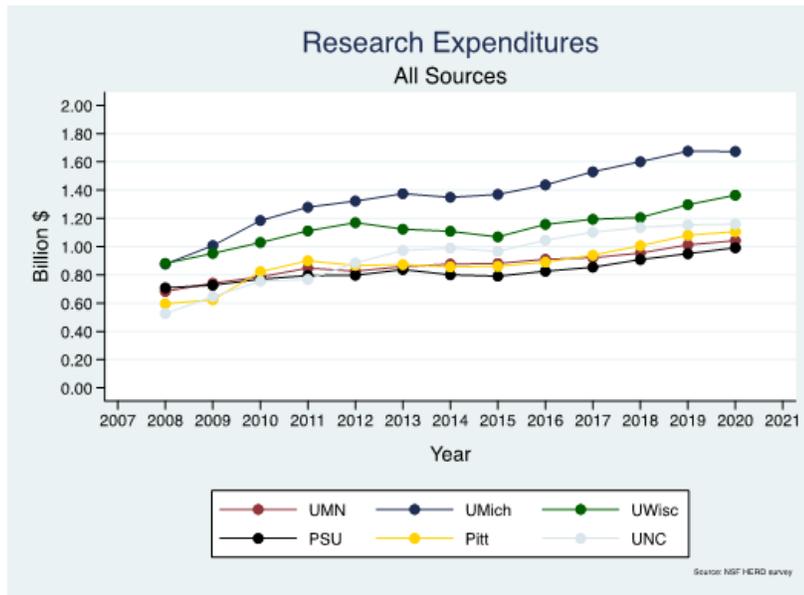
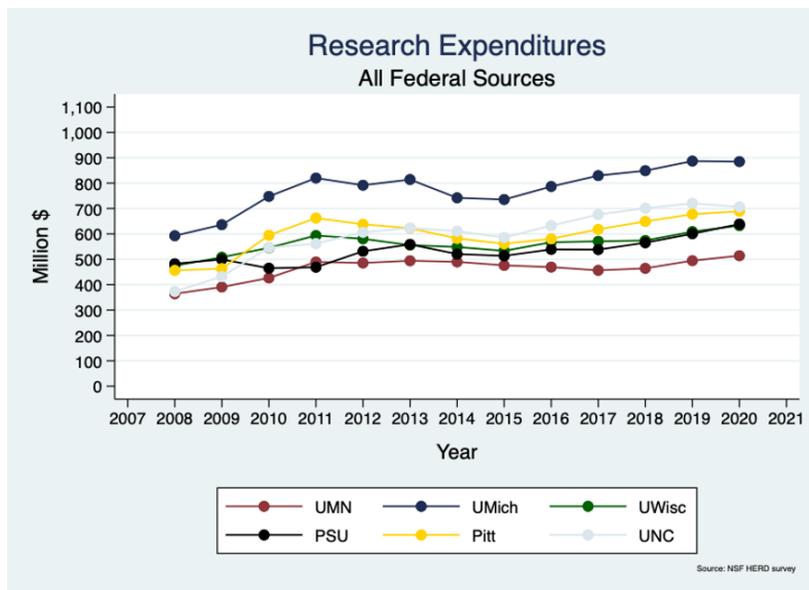


Figure 6 shows the same set of competitors but this time limits expenditures to only those from Federal sources. Revealed here is that relative to selected peers, the University of Minnesota has growth opportunities in federal funding

Figure 6: Federal-source R&D Expenditures at Five Universities over Time



Commercialization and Innovation

As a leading American research university and a land-grant institution, the University of Minnesota is committed to facilitating and accelerating the transfer of knowledge into the world where it can have the most impact and do the most good.

University of Minnesota Technology Commercialization (Tech Comm), housed within the Office of the Vice President for Research, is playing a key role in technology transfer (e.g., licensing, patents), startup companies, and a revitalized corporate engagement effort at the University (see below).

Commercialization Highlights

The University's efforts to commercialize technology maintained a strong performance in FY2021, in spite of the challenges of the pandemic and the uncertainty it caused for academic research and businesses alike.

University of Minnesota researchers continued to be innovative across many technology areas, and Tech Comm played a vital role in bringing those technologies to businesses of all sizes—from startups to Fortune 500s—reflected in record numbers of both licensing deals and startups.

Outreach was especially important this year, as Tech Comm continued to provide coaching to all University researchers through numerous virtual events. Tech Comm recognizes that a diverse and inclusive community is a vital part of innovation success. This past year, Tech Comm broadened outreach to underrepresented researcher groups and increased the diversity of its mentoring and advising community that supports those researchers. The stories of five researchers from diverse backgrounds were featured on Tech Comm's news page and were shared further in other University publications. Tech Comm also cultivated new prospects and was able to increase diversity on its 350-member Business Advisory Group.

The University's technology transfer work has been recognized for its excellence in national and global performance, and these are a few of the Tech Comm team's recent accomplishments and recognitions:

1. Record number of startups launched (20) and licensing deals executed (236)
2. Ranked 18th on the NAI list of [Worldwide Universities Granted US Utility Patents](#) (2020)
3. Expanded corporate engagement across the University, including a master research agreement and [12+ projects with Cisco Systems](#)
4. Tech Comm received a [Tekne Award](#) for COVID-19 Community Response

5. Discovery Launchpad mentored/coached 11 UMN startups, and via a [Launch Minnesota grant](#), opened the incubator to 10 startups outside the University
6. MNBridge, a new commercialization gap-funding program, received \$700K in new external funding and helped coordinate funding for 36 UMN technologies
7. Two UMN fruit varieties, the apple [Triumph™](#) and pear [Juicy Jewel™](#), were named with the help of the UMN community

Technology Licensing, Inventions and Patents, and Sponsored Research

Table 3 (below) shows FY2021 licensing metrics, with one additional new license yielding a new record for the University in this category. The number of Current Revenue Generating Agreements dipped slightly from 2020 levels, but remained at or above levels in the preceding two years. The volatile category of Gross Revenue, which can vary greatly year-to-year, was up compared to FY2020.

Table 3: Technology Commercialization Data (FY2017-2021)

	2017	2018	2019	2020	2021
LICENSES & REVENUE					
New Licenses	213	230	223	235	236
Current Revenue Generating Agreements	545	575	571	601	575
Gross Revenue	\$22.6	\$16.1	\$20.7	\$14.1	\$17.4
STARTUPS					
Startup Companies Formed	18	13	19	19	20
INVENTIONS & PATENTS					
Invention Disclosures	406	400	391	397	332
New Patent Filing Rate*	57%	45%	42%	38%	38%
Issued Patents (US and Foreign)	147	186	187	182	181
MN-IP					
MN-IP Research Agreements	72	86	103	73	60
Companies w/ MN-IP Research Agreements	51	58	77	69	51
Sponsored Research Commitments	\$20.9	\$21.3	\$22.5	\$27.9	\$15.3

**New Patent Filing Rate is the number of new patents filed during the fiscal year divided by the number of new disclosures in the same time period*

Dollar amounts in millions

Technology Commercialization, Wellspring Sophia; U of M Enterprise Financial System

The number of Invention Disclosures from faculty and other researchers dropped in FY2021 from a previous plateau of around 400 disclosures in the previous four years. Over FY2020 and FY2021, the pandemic kept many UMN researchers from their facilities entirely—frequently for months—and then on-campus safety requirements limited the number of personnel in many facilities, which could have contributed to the FY2021 decline.

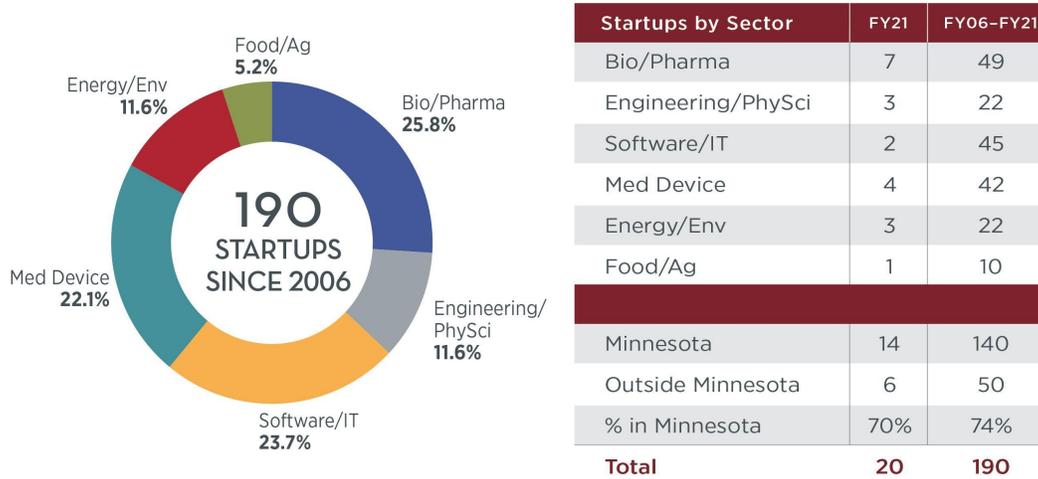
The new Patent Filing Rate and the number of Issued Patents remained relatively steady from FY2021. The number of MN-IP Research Agreements, Companies w/MN-IP Research Agreements, and Sponsored Research Commitments all fell in FY2021, possibly as a result of the pandemic's effects at the University and at companies that sponsor research.

Venture Center

Over the last year, Tech Comm's Venture Center launched a record 20 startup companies based on discoveries and inventions by University researchers. As is typically the case, the University's new startups spanned many sectors (Figure 7 below).

Since 2006, Tech Comm's Venture Center has helped to launch more than 190 startup companies—with a remarkable 75% still active, far above the average percentage of startups that succeed. Overall, UMN startups have attracted more than \$1.15 billion in investment (\$654 million in startup investment capital and \$498 million from IPOs and acquisitions, FY2006-2019), and 10 UMN startups have been acquired or have gone public from 2017 to the present, underscoring the relevance and value of University ideas and technologies.

Figure 7: Startup Companies by Industry Area, FY06-FY21



Technology Commercialization, Wellspring Sophia

Discovery Launchpad MN

A new startup incubator program based at the University of Minnesota provides one-on-one coaching to help accelerate the growth of early-stage Minnesota companies beyond the University.

Discovery Launchpad MN, operated by Tech Comm’s Venture Center and funded by the state’s Launch Minnesota program, offers a unique opportunity for startups that have previously received an Innovation Grant from Launch Minnesota to set their companies up for greater success. The program provides individual advising from a team of seasoned business advisors sourced from the Venture Center’s Business Advisory Group, and 10 Minnesota startups from outside the University have participated thus far.

Discovery Launchpad MN is leveraging the knowledge, experience, connections, and success of Discovery Launchpad, the University’s existing incubator for coaching and support specifically for companies commercializing technology stemming from University research.

Corporate Engagement

As mentioned above, MPact 2025's Commitment 2 includes themes of Discovery, Innovation & Impact, and Engagement. In partnership with many other parts of the University, particularly the University of Minnesota Foundation (UMF), the Office of the Vice President for Research (OVPR) has been tasked with leading many aspects of this commitment, including growing corporate partnerships, bringing new innovations to market, partnering in place-based initiatives, and having real impact on the economic growth of Minnesota.

At the June 2020 request of President Gabel, unprecedented collaboration between OVPR and UMF led to the establishment of the Corporate Engagement Center (CEC), which offers a unified and consistent point of contact for corporations and entrepreneurs interested in partnering with the University. The CEC offers concierge-like relationship management to ensure corporate partners may easily navigate the complex university, especially as regards research, technology transfer, and talent recruitment.

Corporate engagement is a key part of OVPR's refocused plan and organizational structure to drive innovation impact of University research for the state, the nation, and the world. In the new structure, CEC works arm in arm with Tech Comm and SPARC (see below) to drive OVPR's innovation impact framework. Clear goals and seamless coordination will enhance not only corporate partnerships, but the impact of the University's research enterprise on our collective prosperity, health, and security.

Strategic Partnerships and Research Collaborative (SPARC)

Formally launched in January 2019, SPARC is a research and innovation hub. It promotes and advances interdisciplinary partnerships, engaging University of Minnesota researchers and practitioners to take advantage of non-traditional and large-scale research opportunities.

Because faculty researchers are not employees in a traditional sense of being directed to this or that project, SPARC promotes and advances external partnerships and projects that put our partners, faculty, staff, and students at the forefront of global innovation, impact, and change. SPARC provides a comprehensive supporting structure that allows local to global partners and faculty and staff from across the University system to build interdisciplinary and multi-sectoral programs to solve complex challenges.

Over the past two years, SPARC has held over 160 "collision events" and other facilitated meetings bringing together over 1,800 scholars and partners from different disciplines around project themes and opportunities. SPARC has been instrumental in working with teams in the UMN system to land research awards from diverse funders totaling over \$100 million in its first two years. The SPARC team has worked with researchers from all five campuses and nearly all UMTC colleges.

SPARC is currently working with several University of Minnesota teams on large-scale project proposals, strategic planning, program management, impact assessment, and developing external partnerships. Some examples include:

- Facilitating and developing research and sustainability strategies with interdisciplinary teams and centers
- Managing the launch of the Center for Medical Device Cybersecurity, a new program requested and funded by major medical device and health delivery organizations
- Providing targeted assistance in planning, program evaluation, and communications to University teams

OVPR Research Advancement Programs

The Office of the Vice President for Research oversees a number of programs and initiatives designed to support and nurture the University’s research enterprise. Resources provided by the Research Advancement office provide a broad range of resource opportunities, from smaller awards provided to jump-start new ideas to larger awards designed to incentivize collaborations across disciplines that address strategic needs.

Ideally, Research Advancement awards seed research that has the potential to attract sustaining external support, but they also provide funding for projects important to our communities and our state that do not have other potential resources. Research Advancement funds are also used to leverage external support where internal matching funds are required, to acquire critical infrastructure having the potential to accelerate the progress of multiple researchers, and to catalyze rigorous, solution-oriented research on social justice topics. Over the past five years, Research Advancement programs have provided more than \$37.4 million to researchers.

Grant-in-Aid

The Grant-in-Aid of Research, Artistry, and Scholarship Program provides grants to support scholarly and artistic activities of faculty and their graduate students to foster excellence. Grant- in-Aid (GIA) projects represent the breadth and depth of University research in all disciplines and fields. While any faculty can apply for GIA funding, it plays an especially important role in providing new professors and emerging researchers with opportunities to pursue research and scholarship that may not yet have received external funding. In the past five years, \$12.7 million has been awarded through the GIA program. For every dollar invested, \$9.9 in external funding was generated in fiscal years 2015-2019.

Minnesota Futures

The Minnesota Futures program supports extraordinary research by nurturing interdisciplinary ideas. In FY2021, two grants were awarded for a total of \$500,000. The title

of the two projects were: “Measuring and Enhancing Creativity and Brain Flexibility in Adolescents with Depression” and “Nonthermal Plasma Processes for Sustainable Extraction and Processing of Minnesota’s Titanium”. Minnesota Futures awards are supported by technology commercialization revenue, and since 2008, the grants have supported research by faculty who go on to win substantial grants and whose innovations reach the market to potentially improve the lives of millions. For every dollar invested, \$5.22 in external funding was generated in fiscal years 2014-2018.

Grant Matching Funds

Some external funders require an institution to match funds to a specific grant activity. As grant processes become more competitive, the demand for such institutional matching funds continues to increase, resulting in higher levels of required institutional investment. The University works in partnership with colleges throughout the grant proposal process to coordinate the University’s total commitment in matching funds, which averages \$1.19 million annually.

Research Infrastructure Investment Program

The Research Infrastructure Investment Program is one way the University ensures it maintains robust, state-of-the-art equipment to support research and academic endeavors. In FY2021, over \$1.7 million was awarded to 10 research projects, reaching 10 departments, units, and centers; four colleges; on the Duluth and Twin Cities Campuses. Colleges/centers are required to provide one-to-one matching funds for each award. Awards support research infrastructure, facilities, and support services over a variety of University research areas including:

- The Light of Knowledge: Enhancing Informal Learning Engagement (Goldstein Museum, Cdes)
- Heirloom Holsteins for Functional Genomics Studies (Animal Science, CFANS)
- Acquisition of a System to Enable Research in Quantum Information (Electrical and Computer Engineering, CSE)
- Enhancing the Outdoor StreamLab: A full-scale eco-geomorphology laboratory (St. Anthony Falls Lab, CSE)
- 10,000 Families Study and Extension: Partnering with Minnesota communities for better health (Pediatrics, Medical School)
- Surface Characterization Instrumentation to Advance Interdisciplinary Research at the University of Minnesota-Duluth (Natural Resource Research Institute, UMD)

Social Justice Impact Grants Program

Established in the late summer of 2020, Social Justice Impact Grants (SJIG) aim to catalyze rigorous, solution-oriented research on social justice topics, including criminal justice reform, housing segregation/gentrification, systemic racism, achievement gaps, health disparities, environmental justice, and related topics.

SJIG funds are to support research that holds high potential for building a more equitable and just society, future external funding, and career advancement. All research designs and methodological approaches (e.g., quantitative, qualitative, mixed method, record reviews) are welcome. Focus may be on any geographical place or scale, but work benefiting the state of Minnesota is prioritized.

OVPR plans to support 3-6 awards per year with budgets of \$25,000 - \$50,000 each for a 12-month period. In FY2021, one award was funded for \$44,217 to the Department of Family Medicine in the Medical School. The project was titled "Bridging Divides Between the Hmong Community and Mental Health Services in the Telehealth Age through Cultural Brokers."

State of Minnesota Partnerships

A primary mission of the University of Minnesota is to contribute to the prosperity, health, and security of the state of Minnesota. Partnership is essential and reflected in MPact 2025 goal and action item 2.3, which is to increase state partnership funding. A few of the major partnerships the research enterprise has with the state are as follows:

Established in 2013, MnDRIVE is a research partnership between the University of Minnesota and the State of Minnesota that has supported five areas of research strength aligned with the state's key and emerging industries to address grand challenges. MnDRIVE continues to be a unique, collaborative research model engaging transdisciplinary teams of researchers across the University to address the MnDRIVE topic areas in partnership with industry and other community stakeholders.

The University and state partnered quite successfully in a collective response to the COVID-19 pandemic. Apart from medical and public health consultation, researchers in the Medical School supported epidemiological surveillance and testing throughout the state. In partnership with other testing groups, this work was a key part of the state's pandemic response.

Other State of Minnesota partnerships include funds delivered specifically to support the work of the MN Partnership for Biotechnology & Medical Genomics, Center for Transportation Studies, the Natural Resources Research Institute, the Minnesota Aquatic Invasive Species Research Center, the Minnesota Invasive Terrestrial Plants and Pests Center, and the Agricultural Experiment Station. University researchers have also been successful partners in understanding and addressing

challenges to Minnesota's natural resources through the Legislative-Citizen Commission on Minnesota Resources (LCCMR). As the Board considers the appropriate metric to monitor in the context of the MPact 2025, we have begun our preparations to report more deeply on this topic.

Research Is Teaching

As discussed above, American research universities offer unique and essential skills to students of all levels, from undergraduate through doctoral. Student involvement in research benefits the research, faculty researchers, the student, and the community. Research prepares students to be the innovators of tomorrow by training them in the practices of research and discovery. And the training is *doing*: it is the students themselves who create new knowledge from their work, present their findings to national and international audiences, and contribute to the scholarly record in profound and meaningful ways. Accordingly, goal and action 2.1 of the University of Minnesota's MPact 2025 plan includes the goal to prioritize research opportunities for all students including the measure of the same.

A key goal of the University is to incentivize students to participate in research opportunities that are broadly available to them, and specific metrics are part of MPact 2025. As Minnesota's only major research university, UMN programs supporting student research experiences include:

- Undergraduate Research Opportunities Program (UROP)
- Research Experience for Undergraduates (REU)
- Interdisciplinary Doctoral Fellowships (Graduate School)
- Undergraduate major requirements
- Grand Challenges initiatives of the Twin Cities campus

Many of these programs are designed to tightly couple curricular offerings with ongoing research in order quickly to translate results from the field/lab/clinic to the classroom, thereby equipping students with the knowledge and expertise most in demand in the marketplace.

In the most recent Student Experience in the Research University (SERU) survey, 37% of UMN undergraduate students who responded to the survey reported that they have assisted faculty in conducting research. The MPact 2025 plan goal for this measure is 50% by 2025. As a leading research institution, the University is well positioned to achieve this goal.

Conclusion

In an era of both great disruption and dire need, the University of Minnesota's research enterprise is not only sound but breaking success records. Guided by MPact2025, OVPR values of Excellence, Integrity, Responsiveness, and Impact, and unprecedented collaboration, University researchers are contributing to the prosperity, health, and security of the state, nation, and world. Notable accomplishments include \$1.15 billion in sponsored research awards in FY2021; \$1.07 billion in systemwide R&D expenditures in fiscal year 2020; top 10 public research university ranking based on R&D expenditures; Tech Comm establishment of 20 startup companies, 332 disclosures, and routine success with the innovation MN-IP framework; establishment of a Corporate Engagement Center and Innovation Impact framework; advancement of place-based innovation district initiatives; and increased attention to engaging all students in research experiences.

Strategic concerns include under-investment in faculty, graduate students, physical infrastructure, and key services in research administration that must grow with increased research activity. International dynamics may also complicate collaborative efforts. Ever-increasing and sometimes-changing research regulations present compliance and cost concerns. Ensuring welcoming, safe, and productive research environments for everyone—especially the historically disadvantaged—necessitates tireless vigilance.

Too often overlooked, research leadership and administration must constantly adapt while never compromising the core values of academic freedom and institutional reputation. Importantly, OVPR's values of excellence, integrity, responsiveness, and impact are not inconsistent with administrative efficiency. During the past year, the OVPR sunset an aging and expensive Research Compliance Office and stood up a new more efficient group named the Risk Intelligence and Compliance Team (RIACT), with the latter being more reliant on system data and analytics, nimbleness, and enhanced partnerships across the system. Among other initiatives, OVPR also partnered with the Medical School to establish a new management information system that relies on existing data in order to improve the speed with which life-saving clinical trials proceed through the important regulatory apparatus.

In closing, a brief excerpt from the National Research Council's 2012 text *Research Universities and the Future of America* captures the importance of the University of Minnesota's remarkable research enterprise:

“America is driven by innovation—advances in ideas, products, and processes that create new industries and jobs, spur economic growth and support a high standard of living, and achieve national goals for defense, health, and energy. In the last half-century, innovation in turn has been increasingly driven by educated people and the knowledge they produce. Our nation's primary source of both new knowledge and graduates with advanced skills continues to be its research universities.” (1)



Annual Report

University Research & Technology Commercialization

Board of Regents | Mission Fulfillment Committee | December 16, 2021

J. Michael Oakes
Interim Vice President for Research



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“America is driven by innovation—advances in ideas, products, and processes that create new industries and jobs, spur economic growth and support a high standard of living, and achieve national goals for defense, health, and energy. In the last half-century, innovation in turn has been increasingly driven by educated people and the knowledge they produce. **Our nation’s primary source of both new knowledge and graduates with advanced skills continues to be its research universities.**”

NRC. 2012. *Research universities and the future of America*. National Academies Press.

Excellence

Integrity

Responsiveness

Impact



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Commitments

Commitments represents the intersection of our values and action. They are like a spine to which all else is connected, and are intended to freely complement and interact with one another. The Commitments help us to articulate our vision at the 100,000 feet level, as well as provide direction to frame our organizational identity. The Commitments are inspiring, unifying, and impactful, but not constraining.



1: STUDENT SUCCESS

Meeting all students where they are and maximizing their skills, potential, and well-being in a rapidly changing world.



2: DISCOVERY, INNOVATION & IMPACT

Channeling curiosity, investing in discovery to cultivate possibility, and innovating solutions while elevating Minnesota and society as a whole.



3: MINTERSECTIONS

Inspired by Minnesota to improve people and places at world-class levels.



4: COMMUNITY & BELONGING

Fostering a welcoming community that values belonging, equity, diversity, and dignity in people and ideas.

5: FISCAL STEWARDSHIP

Stewarding resources to promote access, efficiency, trust, and collaboration with the state, students, faculty, staff, and partners.



Commitment 2 – Discovery, Innovation

December 2021

2.1 Increase year-over-year funding growth for **research and industry-sponsored awards**

- Sponsored research awards grow at 5% per year (stretch 7%) in next 5 yrs. **Baseline: \$876M, FY2020**
- Maintain Top 10 public university expenditure ranking in HERD. **Baseline: #10, FY2020**

- **\$1.15B** sponsored research awards, FY2021
- **Top 10** public research university HERD ranking

2.2 Enhance opportunities for **new businesses and startups, corporate partnerships, and technology commercialization**

- Grow to 25 startups per year by 2025. **Baseline: 19, FY2020**
- Increase \$ of industry sponsored awards. **Baseline: \$81.6M, FY2020**

- **20 startups**, FY2021
- **\$255.5M***, FY2021

*Includes \$152M Leidos contract



Commitment 2 – Discovery, Innovation

December 2021

2.3 Increase **State-Sponsored** Research

- Grow 5-year research funding.
Baseline: \$412M, FY2016-2020

- **\$428.7M** in state research awards, FY2017-2021

2.3 Elevate national and international profile and standing while addressing societal needs

- Goal: Top 35 in ARWU (Shanghai) ranking. **Baseline: #40 in world, FY2020**

- **#40** in FY2021 ARWU



Commitment 3 – MNtersections**December 2021**

3.1 Deepen **impact in core areas of strength**, including solutions, cures, and technology

- Increase number of med-tech/health-science disclosures year over year. **Baseline: 239, FY2020**

- **209**, FY2021

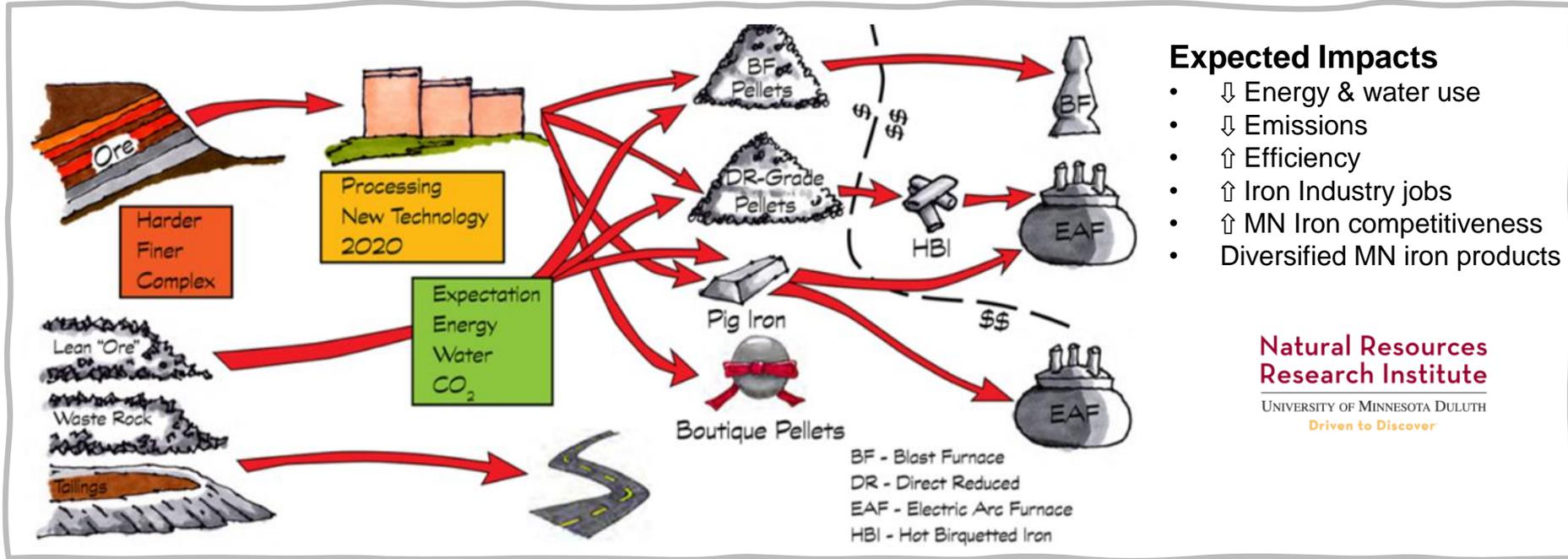
3.3 Develop and deploy new techniques and partnerships for **smart farming and sustainable food supplies, and natural resources**

- Increase number of food, ag-tech, and natural resource-related disclosures year over year. **Baseline: 33, FY2020**

- **29**, FY2021



Story: Iron Innovation at NRRI





State of the Research Enterprise



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FY21 External Research Awards

\$1.15 billion



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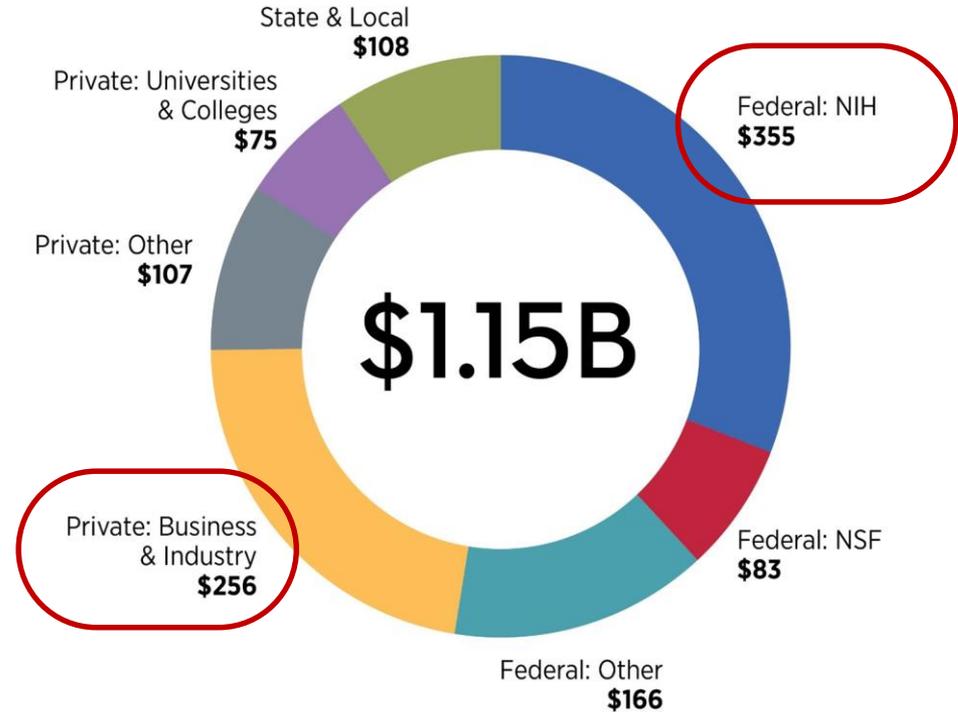
Awards by Source

FY21, All Campuses, \$ millions



Pact 2025

- Grow all awards
- Grow B&I awards
- Grow state awards



Awards by Source by Year

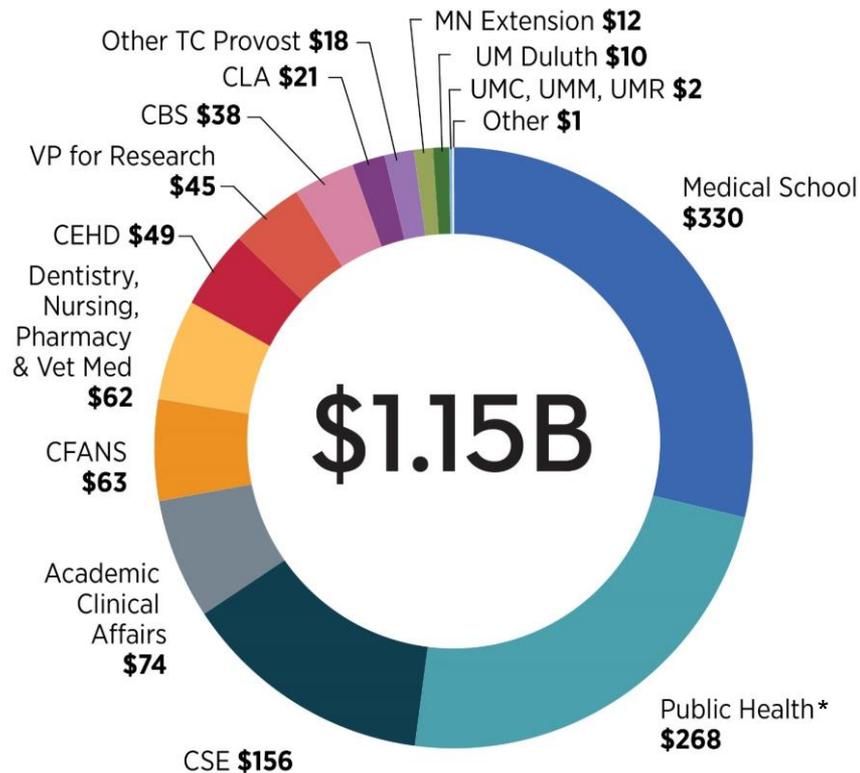
All Campuses, \$ millions

Year	NIH	NSF	DoD	USDA	B & I	Foundations	State
2017	244.0	71.6	26.1	25.6	83.9	28.3	70.4
2018	265.5	80.6	26.2	32.1	64.1	27.6	82.9
2019	312.8	77.7	32.8	32.0	80.4	32.4	72.5
2020	303.8	85.6	29.2	37.2	81.6	27.0	102.5
2021	355.3	82.5	38.0	45.7	255.5	46.6	100.5



Awards by College/Campus

FY21, \$ millions



* Includes \$152M Leidos contract



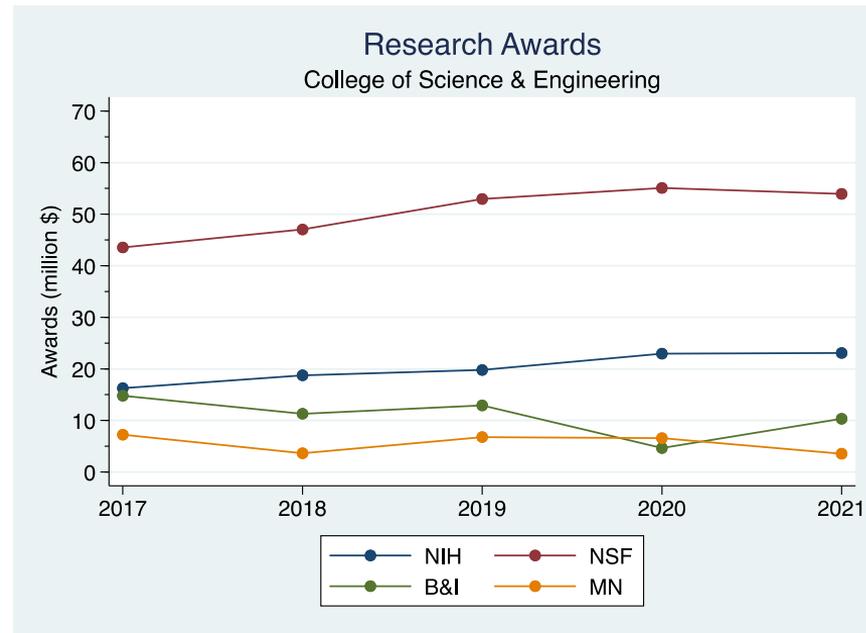
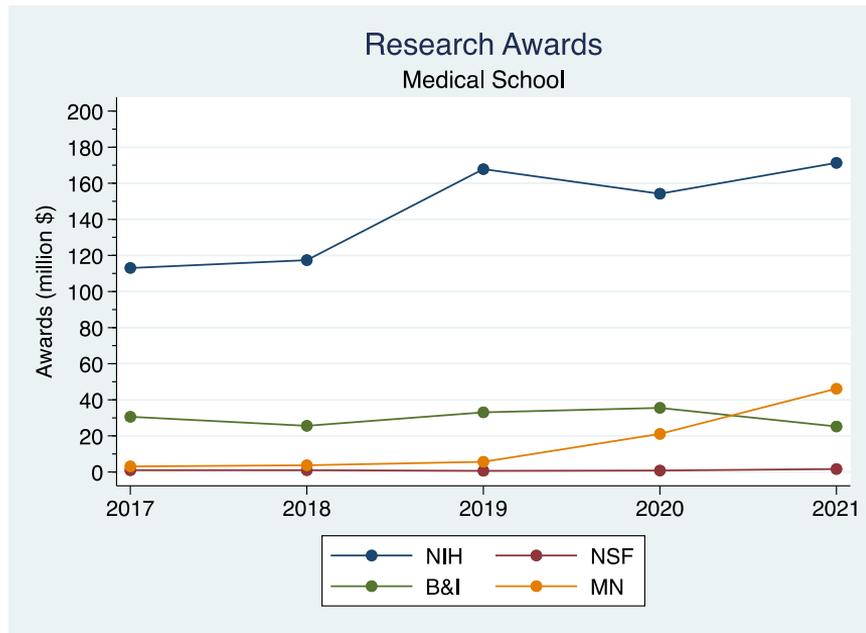
Story: COVID-19 Trials at CCBR

NIH awarded UMN **\$152M** through **Leidos Biomedical** to coordinate international trials to evaluate the safety and efficacy of multiple treatments for SARS-CoV-2. The ACTIV3/3b Study is researching seven investigational agents with Remdesivir.

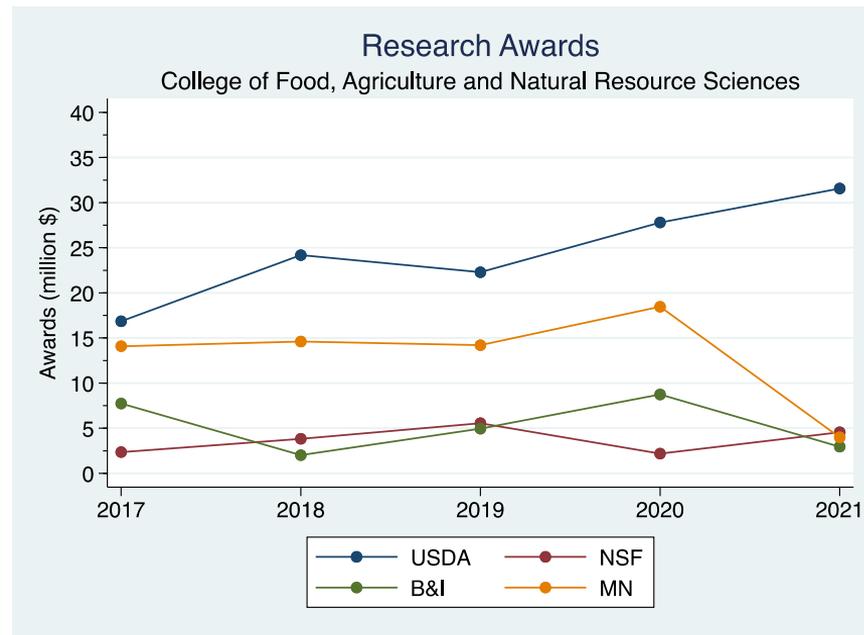
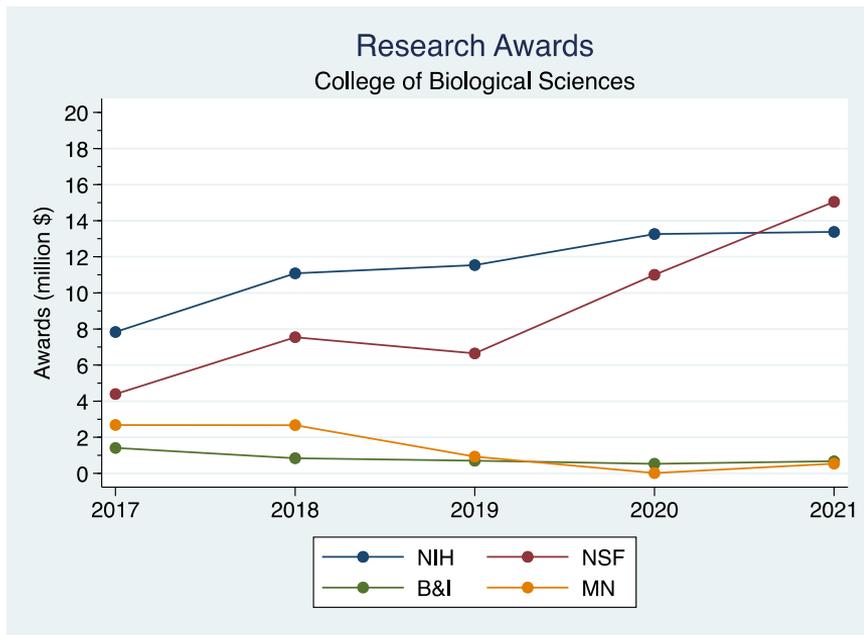
Part of **\$190M** awards to **Prof. James Neaton** and **CCBR** (Coordinating Centers for Biometric Research) in the School of Public Health in FY2021.

Overall, COVID-19 grants to UMN researchers totaled **\$256M** in FY2021.

Awards by College and Type



Awards by College and Type



Story: Improving Equity in Cancer Care



With a \$2.9M grant from the National Cancer Institute, health equity researcher Rebekah Pratt, PhD., is working with women and organizations in the Somali immigrant community, who face an elevated risk for cervical cancer but have low rates of cervical cancer screening. Dr. Pratt is evaluating whether a self-sampling HPV test could increase testing rates among Somali American Women.

6 REASONS TO GET THE HPV VACCINE | **LIX SABABOOD OO LOO QAATO TALAALKA HPV**

1 HPV IS A VERY COMMON VIRUS IN MEN AND WOMEN, AND IT IS NOT THE SAME AS HIV. | **HPV WAA FAYRAS KU WADA DHACO RAGGA IYO HAWEENKA, LA MID SE MA AHAN HIV.**

80% of people will get an HPV infection in their lifetime. | 80% oo dadka waxaa ku dhaca infakashanka HPV-ga noolshooda ugu jirsan heesher.

2 PREVENTING CANCER IS BETTER THAN TREATING CANCER. | **KANSARKA KA HORTAGGISA AYA KA FIICAN DAAWAYNTIISA.**

"Allah has sent down both the disease and the cure, and he has appointed a cure for every disease, so 'treat yourself medicinally'" (PBUH) | "Allah waxuu soo dhiigay xamsunka iyo dawada, xanuun kastana waxuu u yeelay dawadisa, marka is daaweyn" (SCW)

3 THE HPV VACCINATION IS SAFE AND EFFECTIVE. | **TALAALKA HPV WAX KHATAR AH MALAHAN, SHII LA RABAY AYUUNA U SHAQEYAA.**

You get the HPV vaccine to prevent HPV, not to treat HPV. | Talaalka HPV-ga waxaad u qaadaysaa inaad ka hortagto, ee ma shax inaad talaal daaweyso.

THE HPV VACCINE PREVENTS OVER 90% OF CERVICAL CANCER THAT ARE CAUSED BY HPV FOR MEN AND WOMEN. | TALAALKA HPV WAXUU KA HORTAGA RAGGA IYO HAWEENKA 90% KANSARADA CANSARADA IYO SHII HPV SE RAGGA IYO HAWEENKA.



Energizing Research Impact

SOCIAL JUSTICE IMPACT GRANTS

OFFICE OF THE VICE PRESIDENT FOR RESEARCH

INNOVATION IMPACT CASE AWARD

OFFICE OF THE VICE PRESIDENT FOR RESEARCH



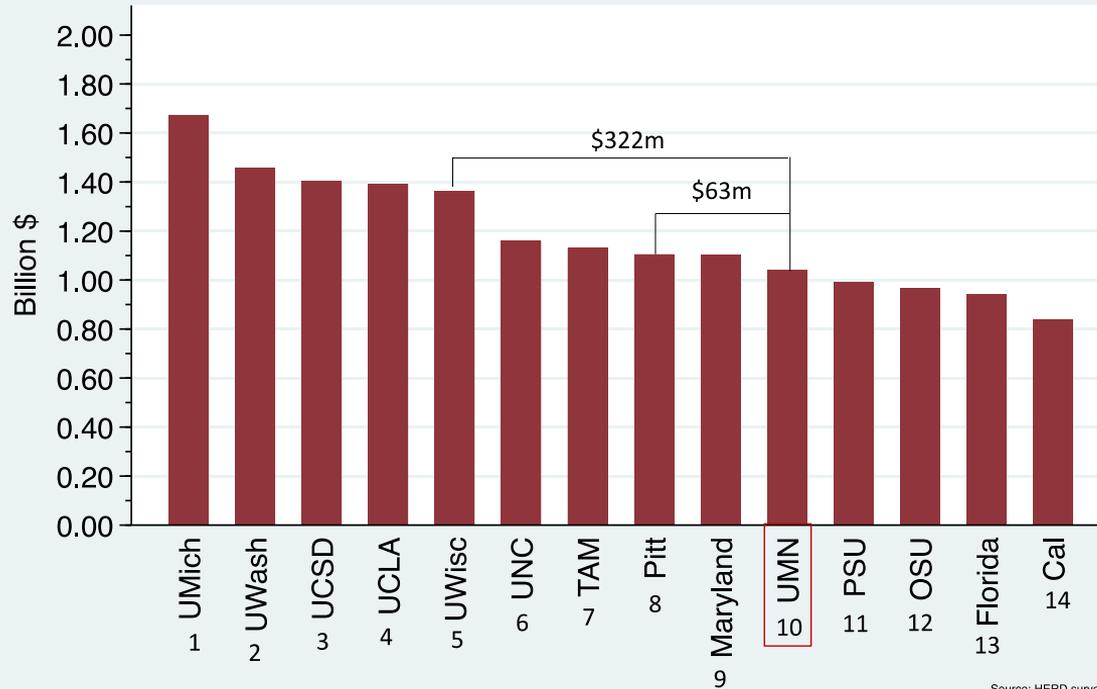
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Rankings & Comparisons



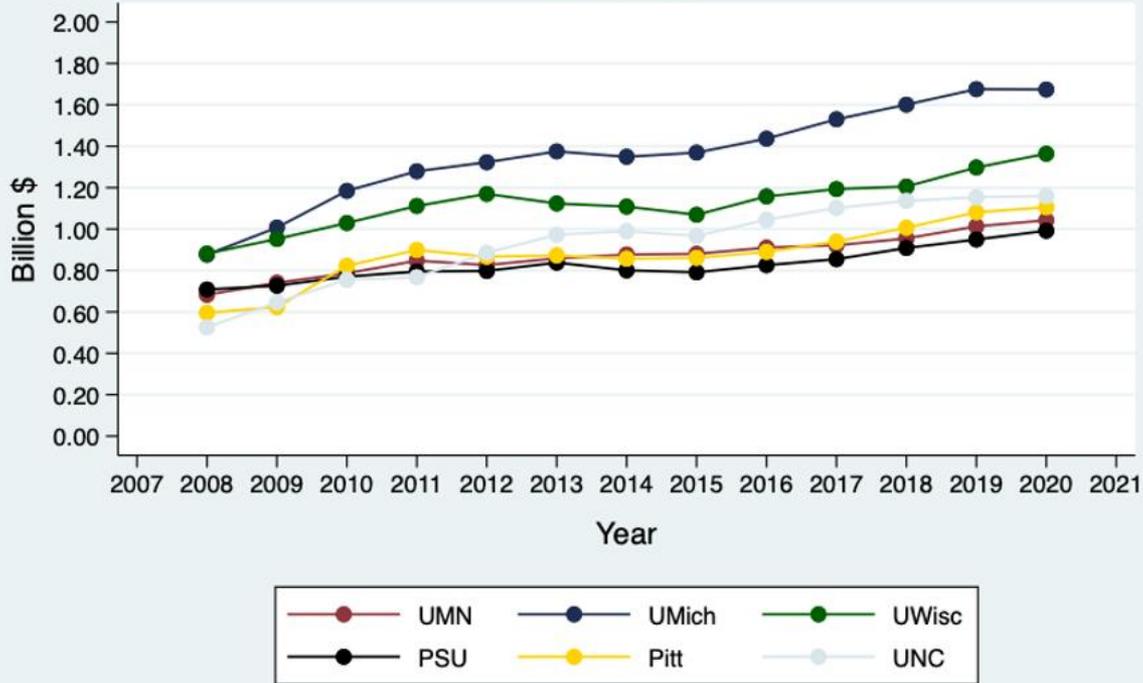
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Total FY20 Research Expenditures Public R1 Universities



Note: UCSF and MD Anderson are not R1 universities

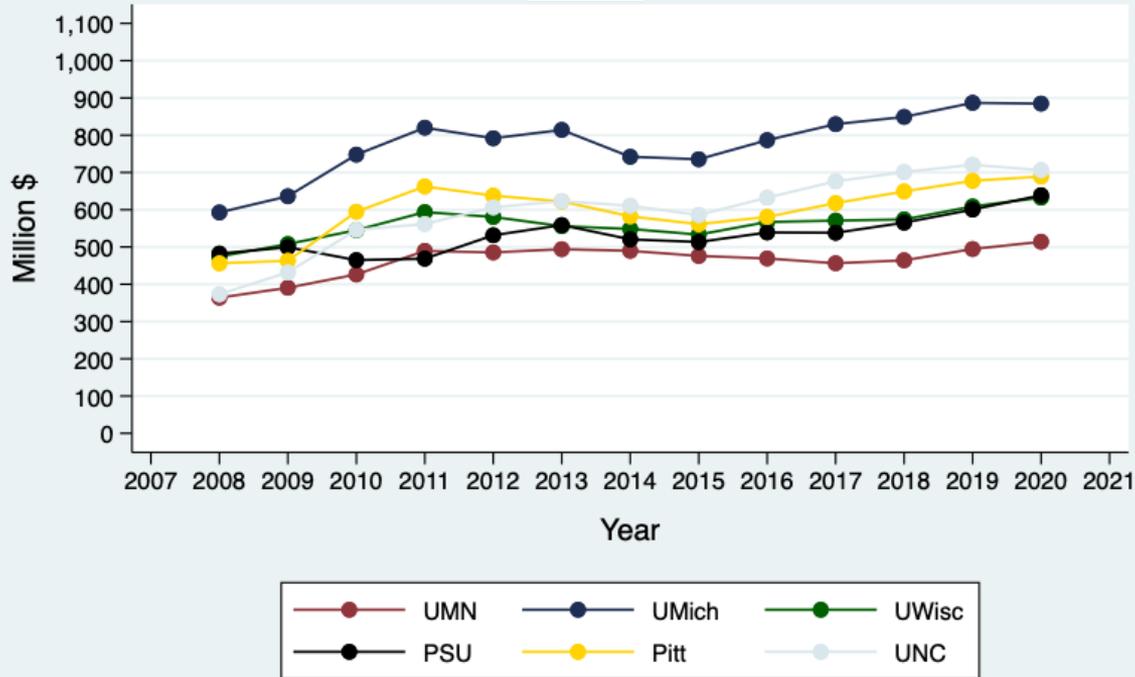
Research Expenditures All Sources



Source: NSF HERD survey



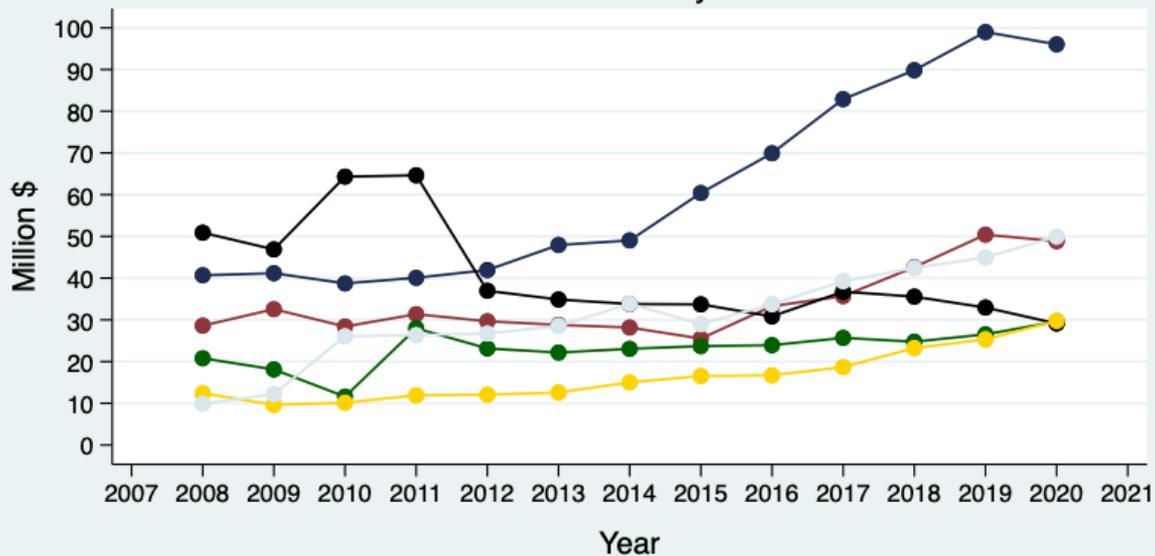
Research Expenditures All Federal Sources



Source: NSF HERD survey



Research Expenditures Business & Industry Sources



Source: NSF HERD survey





TECHNOLOGY COMMERCIALIZATION & CORPORATE ENGAGEMENT



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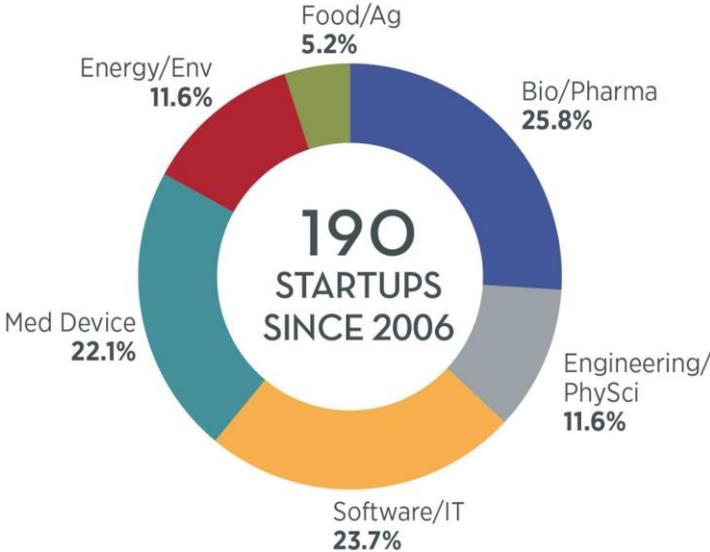
Startups

Pact 2025

- Grow startups

	2017	2018	2019	2020	2021
LICENSES & REVENUE					
New Licenses	213	230	223	235	236
Current Revenue Generating Agreements	545	575	571	601	575
Gross Revenue	\$22.6	\$16.1	\$20.7	\$14.1	\$17.4
STARTUPS					
Startup Companies Formed	18	13	19	19	20
INVENTIONS & PATENTS					
Invention Disclosures	406	400	391	397	332
New Patent Filing Rate*	57%	45%	42%	38%	38%
Issued Patents (US and Foreign)	147	186	187	182	181
MN-IP					
MN-IP Research Agreements	72	86	103	73	60
Companies w/ MN-IP Research Agreements	51	58	77	69	51
Sponsored Research Commitments	\$20.9	\$21.3	\$22.5	\$27.9	\$15.3

Startups by Sector



Startups by Sector	FY21	FY06-FY21
Bio/Pharma	7	49
Engineering/PhySci	3	22
Software/IT	2	45
Med Device	4	42
Energy/Env	3	22
Food/Ag	1	10
Minnesota		
Minnesota	14	140
Outside Minnesota	6	50
% in Minnesota	70%	74%

Total	20	190
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Disclosures



- Grow med-tech/health science disclosures
- Grow ag-tech and natural resource disclosures

	2017	2018	2019	2020	2021
LICENSES & REVENUE					
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Story: Låkri! Technologies from CSE

NSF-funded research in Paul Dauenhauer's lab.

Tech to use renewable materials to create acrylates for common plastic products



“Industry picks up where the universities leave off, playing an equal role in the innovation process. In that sense, there is a **very productive partnership between the universities and industry**. And the knowledge produced as universities and then developed by industry has huge societal payoff with an enormous economic impact on local, national, and international communities.”

Cole. 2010. *The great American university: Its rise to preeminence, its indispensable national role, why it must be protected*. Hachette UK.

Corporate Engagement

OVPR + UMF = CEC!

cec.umn.edu

Corporate Engagement Center

Contact us

Home Ways to engage News and case studies About



Open for business:
Corporate Engagement at
our world-class University

Five campuses. Thousands of resources. One point of access.
The Corporate Engagement Center is your way to connect with a vast network of resources across one of the country's most innovative public research universities.

Partnership success stories



Technology and innovation

For students, faculty, and business partners, the University of Minnesota is a center of invention that creates a clear and widespread economic value.



Talent development

Together with our private and public sector partners, the University transforms students' lives so that students can transform the world.



Visibility and branding

When University of Minnesota resources and expertise are aligned with industry priorities, the results can be field-defining and mutually beneficial.



Executive and employee engagement

Industry executives and professionals engage with the University of Minnesota through teaching, mentorship, expertise and knowledge-sharing, and more.



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Driven to DiscoverSM

Story: Cisco Systems

UMN's partnership with the networking firm **Cisco Systems** will advance cutting-edge technologies that **transform the way people access, manage, and protect data.**

Embodies **new UMN corporate engagement strategy**

- Quick execution: Company presented needs to faculty (14 projects)
- New Master Research Agreement (MN-IP model)
- Partnerships coordinated across UMN (CSOM, CLA, CDES, CSE, Med School)
- Leverages UMN strengths (health care, machine learning/AI, and edge computing)



Strategic Partnerships and Research Collaborative (SPARC)

Supports collaboration across system and with industry, govt, non-profits

Over past two years, SPARC has:

- Held over 160 “collision events” and other meetings with 1,800 researchers
- Helped land more than \$100M in research awards
- System-level; worked with most UMTC colleges



Story: Minnesota Transform

A \$5M humanities grant from the Mellon foundation to UMN's Institute for Advanced Study (IAS) to deepen statewide relationships with diverse communities, including Tribal Nations, to develop new knowledge, visions, and practices for inclusion and justice. Addresses several goals in MPact2025.



Research Is Teaching



Research at the University of Minnesota addresses the needs of both the state and the nation.



The University of Minnesota's land-grant mission means it leverages its knowledge for the public good and works cooperatively with communities to understand and meet their needs.

The University of Minnesota emphasizes the importance of education in conjunction with research. This result is innovation and discovery from new and exciting places. At the University of Minnesota, **research is teaching**—we embed discovery in our curriculum!



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

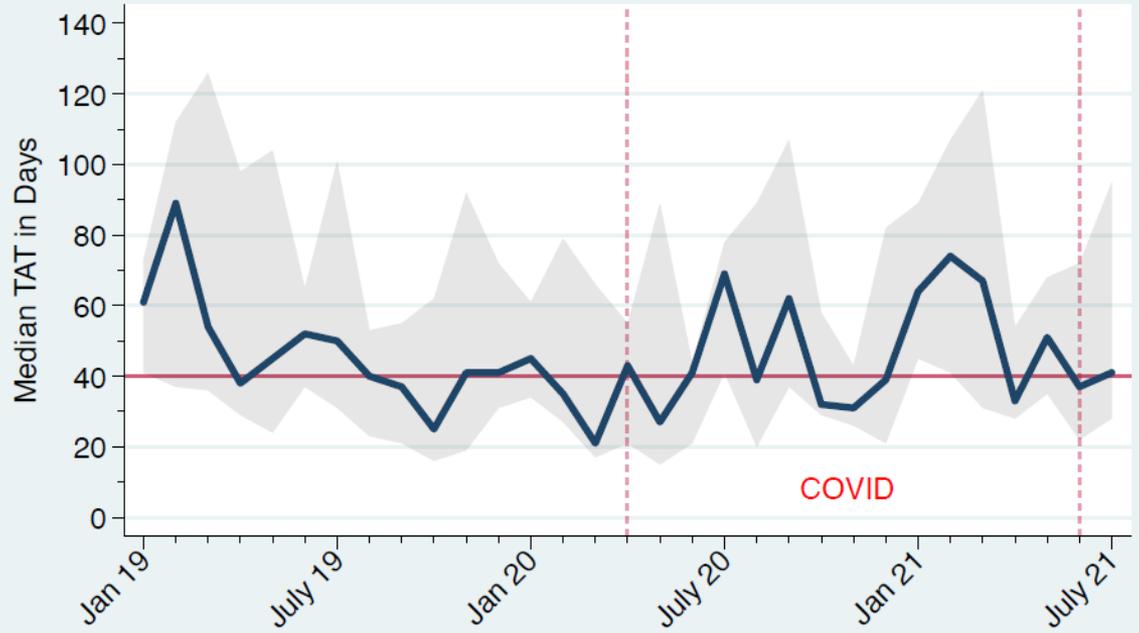
Research Administration

- Sponsored Projects Administration
- Animal Care and Safety
- Human Participant Protections
- Biotechnology Oversight
- Research and Supercomputing Resources
- Research Advancement
- Risk Intelligence and Compliance Team



IRB TurnAround Time

Medical School Only



Gray is observed 20-80th percentile
CTSI Target is 40 days



The Future of University Research

External Environment

- Federal investment: NIH, NSF, DOD, USDA, etc
- State of Minnesota investment and economy
- Corporate partners & startup ecosystem
- Place-based initiatives
- International dynamics

Internal Environment

- From interdisciplinary to problem-solving research
- Innovation Impact Framework: CEC + Tech Comm + SPARC
- Shared research facilities
- Strategic internal investments (DEI, Sustainability, Impact Grants, Impact Awards)
- Process design and evaluation for administrative improvements and efficiencies

Take Homes

- The University of Minnesota is a leading American Research University
- The research enterprise is strong, growing, and impactful, despite COVID-19
- Expect modest drop in awards and increase in expenditures
- Short-term threat is labor shortage and rising wages
- Longer-term threat is under-investment in faculty and core services
- Land-Grant University = Problem-Solving University
- Guided by MPact2025
- Excellence, Integrity, Responsiveness, Impact
- #Team

Questions?



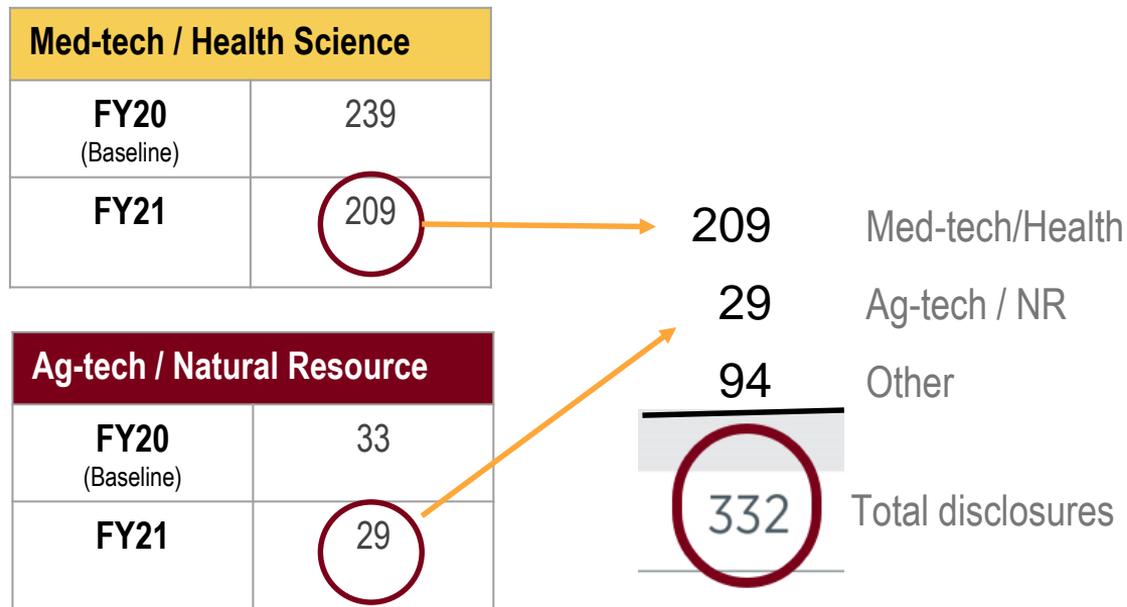
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Appendices



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Disclosure Breakdown



Impacts

ACADEMIC

ACADEMIC IMPACT



Contribution to advances across and within disciplines, including significant advances in understanding, method, theory, and application.

CULTURAL

SOCIETAL & ECONOMIC IMPACT



Contribution to people's understanding of ideas and reality, values and beliefs.

ECONOMIC

SOCIETAL & ECONOMIC IMPACT



Contribution to a company's revenues and profits (micro level) and economic returns through increased productivity or economic growth (macro level).

EDUCATIONAL

SOCIETAL & ECONOMIC IMPACT



Contribution to education, training and capacity-building, including through curricula, educational tools, and qualifications.

ENVIRONMENT

SOCIETAL & ECONOMIC IMPACT



Contribution to managing the environment, such as protecting natural resources, reducing environmental pollution, improving weather forecasting, and tackling the climate crisis.

HEALTH

SOCIETAL & ECONOMIC IMPACT



Contribution to public health, life expectancy, health-related quality of life, prevention of illness, and reduced health inequality.

POLITICAL

SOCIETAL & ECONOMIC IMPACT



Contribution to how policymakers act, to how policies are constructed, and to political stability.

SOCIAL

SOCIETAL & ECONOMIC IMPACT



Contribution to community welfare and quality of life, and to behaviors, practices, and activities of people and groups.

TECHNOLOGY

SOCIETAL & ECONOMIC IMPACT



Contribution to the creation or improvement of products, processes and services.

Source: University College Dublin Impact Classification System based on European Science Foundation taxonomy.



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM



BOARD OF REGENTS DOCKET ITEM SUMMARY

Mission Fulfillment

December 16, 2021

AGENDA ITEM: Encouraging Multidisciplinarity in Research and Teaching

Review

Review + Action

Action

Discussion

This is a report required by Board policy.

PRESENTERS: Rachel Croson, Executive Vice President and Provost
J. Michael Oakes, Interim Vice President for Research
Robert McMaster, Vice Provost and Dean of Undergraduate Education

PURPOSE & KEY POINTS

The purpose of this item is to provide an overview of institutional factors that can enhance or inhibit multidisciplinary work. This item will also discuss current and potential policy and administrative efforts the University can use to ensure successful multidisciplinary opportunities in research and teaching.

Key points of the presentation include:

- A definition of the term “multidisciplinary” and why it is important to measure and incentivize it.
- Potential barriers to – and tactics to encourage – multidisciplinary research and teaching.
- The role of post-baccalaureate education and faculty affairs in encouraging multidisciplinary.

The topic aligns with Commitment 2: Discovery, Innovation and Impact, and particularly with Goal 2, “Increase multidisciplinary opportunities in research and curriculum,” of the MPact 2025 Systemwide Strategic Plan.

BACKGROUND INFORMATION

- National Science Foundation [definition of interdisciplinary research](#).
- September 2015 special issue of *Nature*, including article “[Why interdisciplinary research matters](#)” ([see also full issue](#)).
- December 2006 article from *Clinical Investigative Medicine*, “[Multidisciplinarity, interdisciplinarity and transdisciplinarity in health research, services, education and policy: 1. Definitions, objectives, and evidence of effectiveness](#)”
- 2005 report from the National Academies of Science, Engineering, and Medicine, “[Facilitating Interdisciplinary Research](#)”

Encouraging Multidisciplinary in Research and Teaching

Board of Regents | Mission Fulfillment Committee | December 16, 2021

Rachel Croson
Executive Vice President and Provost

Michael Oakes
Interim Vice President for Research

Robert McMaster
Vice Provost and Dean of Undergraduate
Education



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

MPact 2025

Commitment 2: Discovery, Innovation and Impact

Goal 2

Increase multidisciplinary opportunities in research and curriculum





What is “Multidisciplinarity”?

- Various terms: interdisciplinary, multidisciplinary, transdisciplinary
- Strong multidisciplinary work requires strong disciplinary knowledge
- We work to define it for the purpose of measuring it, incentivizing it
- The ultimate goal is impact, which can be achieved in multiple ways



Potential Barriers to Multidisciplinary Research

- Academic culture that rewards individual vs. team accomplishment
- Academic culture that rewards disciplinary contributions
- Specialization and language barriers
- Administrative and fiscal structures



Tactics to Encourage Multidisciplinary Research

The screenshot shows the top navigation bar of the University of Minnesota's Office of the Vice President for Research website. The header includes the university logo and the slogan "Driven to Discover". Below the header, the text "Office of the Vice President for Research" is displayed. A navigation menu contains links for "About Us", "Resources", "Funding & Awards", and "Ethics & Compliance". The main content area features a blue background with the text "Bringing people together in new ways, fostering discoveries, and making our world a better place". Below this, a white box contains a news item: "University of Minnesota had \$1.15 billion in external research funding in fiscal year 2021, a 31 percent jump that exceeded the \$1 billion award mark for the first time." A "Learn More" link is provided at the bottom of the news item.

Current Activities

- Research centers
- Minnesota Futures
- Collisions Program
- Funding agency requirements

New Activities

- Impact Award and Grants
- Shared research facilities effort
- Investment for MNtersections areas



Potential Barriers to Multidisciplinary Education

- Specialized accreditation and rankings
- Curriculum and instructor expertise
- Administrative and fiscal structures



Tactics to Encourage Multidisciplinary Teaching

Current Activities

- [Grand Challenges Curriculum](#)
- Interdisciplinary minors

New Activities

- Revision of core curriculum

Spring 2022

GCC 3011/5011

Pathways to
Renewable Energy

A photograph of a large array of solar panels installed on a roof, with a clear blue sky in the background.

GCC 3013/5013

Making Sense of Climate Change
Science, Art, and Agency

An art installation featuring people in silver thermal blankets, with a globe and other environmental symbols in the background.

GCC 3016/5016

Science and Society: Working Together to Avoid the Antibiotic Resistance Apocalypse

A close-up photograph of several petri dishes containing various colored agar cultures, likely used in a microbiology laboratory.

GCC 3025

Seeking the Good Life at the End of the World:
Sustainability in the 21st Century

A photograph of a space shuttle in orbit, with the Earth's blue and white clouds visible in the background.

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

Multidisciplinary in Post-Baccalaureate Education

- Disciplines evolve when graduate students and their research interests lead faculty advisors toward new areas of inquiry
- Professional programs evolve to meet the demand for more multidisciplinary expertise to fill positions in the field
 - Within the health sciences, interprofessional education prepares graduates to work in today's healthcare teams



Multidisciplinary in Faculty Affairs



- Tenure and Promotion Process Changes
- Development of faculty awards: especially early scholars, and for teams
- Memoranda of understanding for joint hires
- Role of academic leadership to express support, provide incentives



MPact 2025 Measure

Increase multidisciplinary grants and courses each year

How are we counting these?

- **Courses baseline:** count Grand Challenge Courses (TC) and similar courses on other campuses
- **Grants baseline:** Sponsored projects data for grants/contracts that span schools/colleges



Summary and Discussion

Multidisciplinary research and teaching is valued because of the potential for greater impact for discoveries and enhanced learning outcomes.

- To what extent do you or your organizations value multidisciplinary education when you seek to employ someone?
- What are the opportunities for philanthropy and development?
- Do you see opportunities for the University to further reduce the barriers we've discussed?





BOARD OF REGENTS DOCKET ITEM SUMMARY

Mission Fulfillment

December 16, 2021

AGENDA ITEM: Consent Report

Review

Review + Action

Action

Discussion

This is a report required by Board policy.

PRESENTERS: Rachel Croson, Executive Vice President and Provost

PURPOSE & KEY POINTS

The purpose of this item is to seek approval of new academic programs and program additions, program deletions and discontinuations, and/or program changes; conferral of tenure for outside hires; and conferral of faculty emeritus status, as outlined below.

I. Request for Approval of New Academic Programs

- College of Education and Human Development (Twin Cities campus)—Create a post-baccalaureate certificate in Learning Analytics
- College of Education and Human Service Professions (Duluth campus)—Create a B.A.Sc. degree in Childhood Nature Studies

II. Request for Approval of Changed Academic Programs

- College of Food, Agriculture and Natural Resource Sciences (Twin Cities campus)—change the name of the undergraduate minor in Sustainable Agriculture and Food Systems to Food Systems
- Rochester Campus—Create a Lab Based Sciences sub plan in the Health Sciences B.S. degree
- Labovitz School of Business and Economics (Duluth campus)—Create an Integrated Degree Program option in the Bachelor of Business Administration and Master of Business Administration degrees.
- Crookston campus—Create three new sub plans in the Biology B.S. degree

III. Request for Approval of Discontinued Academic Programs

- College of Liberal Arts, School of Public Health, and the Graduate School (Twin Cities campus)—Discontinue the M.A. and graduate minor in Health Journalism and Communications
- College of Arts, Humanities and Social Sciences (Duluth campus)—Discontinue the graduate minor in Music

IV. Request for Conferral of Tenure for Outside Hires

- Andrew Alleyne, professor with tenure, Department of Mechanical Engineering, College of Science and Engineering (Twin Cities campus)
- Nisha Botchwey, professor with tenure, Humphrey School of Public Affairs (Twin Cities campus)
- Mark Rosenberg, professor with tenure, Department of Medicine, Medical School (Twin Cities campus)

V. Request for Approval of Human Fetal Tissue Research Report to the Minnesota Legislature

The purpose of this item is to seek approval of the Human Fetal Tissue Research Report to the Minnesota Legislature. The complete report is provided in the docket materials.

BACKGROUND INFORMATION

Approvals are sought in compliance with Board of Regents Policy: *Reservation and Delegation of Authority* as follows:

- Academic program changes: Article I, Section V, Subd. 2.
- Tenure and/or promotion recommendations: Article I, Section V, Subd. 1.
- Approval of any report to the State of Minnesota that impacts the University's autonomy or addresses the performance of the University and/or its major initiatives: Article I, Section I, Subd. 7.

PRESIDENT'S RECOMMENDATION

The President recommends approval of the Consent Report.

**University of Minnesota Board of Regents
Mission Fulfillment Committee
December 16, 2021
Consent Report: Academic Program Changes**

I. Request for Approval of New Academic Programs

College of Education and Human Development (Twin Cities campus)—Create a post-baccalaureate certificate in Learning Analytics

The College of Education and Human Development on the Twin Cities campus requests approval to create a post-baccalaureate certificate in Learning Analytics, effective spring 2022. As an interdisciplinary area, learning analytics brings together ideas from education, data science, and design to address current education problems. The Learning Analytics certificate aims to develop skills in the use of data to improve learning and teaching in various contexts and is structured to develop understanding in three core areas - foundations, theory, and analytics. The program is relevant for current graduate students in the Curriculum and Instruction and Educational Psychology departments, and more broadly to students within the College of Education and Human Development and related University of Minnesota units (such as Computer Science, Workforce Development, and Industrial/Organizational Psychology). Given the increasing adoption of learning analytics in K-12 schools, the certificate is also attractive to K-12 practitioners. The certificate builds on the unique strengths of the Curriculum and Instruction and Educational Psychology departments, as well as the University's growing capacity in data science and makes use of existing courses and resources.

College of Education and Human Service Professions (Duluth campus)—Create a B.A.Sc. degree in Childhood Nature Studies

The College of Education and Human Service Professions on the Duluth campus requests approval to create a Bachelor of Applied Sciences in Childhood Nature Studies, effective spring 2022. The proposed program entails a nature-based, interdisciplinary foundation of theory and practical skills. Students will study childhood development from an eco-bio-developmental framework and learn the foundations of healthy development and the potential for nature to support children's learning. They will learn to interact with children and families and provide developmentally, and culturally appropriate experiences for children and gain experience in designing and using nature-rich, playful learning environments, such as nature playscapes, early childhood nature play programs, and nature preschools. There is a movement regionally, nationally and internationally toward nature-based childhood programs and a professional movement toward making nature-experiences more accessible and inclusive, which will be a key aspect of this program. Through intentional advising, coursework, and a culminating internship, the program prepares graduates to apply integrated eco-bio-developmental frameworks and work collaboratively across diverse disciplines toward holistic child development. The intended market is northern Minnesota, and the Midwest region. Efforts will be made to recruit from regional Indigenous communities and likely some national recruitment, due to few similar programs. The program will leverage existing courses and resources.

II. Request for Approval of Changed Academic Programs

College of Food, Agriculture and Natural Resource Sciences (Twin Cities campus)—change the name of the undergraduate minor in Sustainable Agriculture and Food Systems to Food Systems

The College of Food, Agriculture and Natural Resource Sciences requests approval to change the name of the minor in Sustainable Agriculture and Food Systems to Food Systems, effective spring 2022. The proposed name change reflects current curricular alignment and will create distinction from a separate existing undergraduate minor in Sustainable Agriculture.

Rochester Campus—Create a Lab Based Sciences sub plan in the Health Sciences B.S. degree

The Rochester campus requests approval to create a Lab Based Sciences sub plan in the Health Sciences Bachelor of Science degree, effective spring 2022. The optional sub plan designates that students have completed at least 16 credits of chemistry coursework and 16 credits of biology coursework, satisfying requirements of external human resources departments for certain laboratory-based positions.

Crookston campus—Create three new sub plans in the Biology B.S. degree

The Crookston campus requests approval to create optional sub plans in Biochemistry, Bioinformatics, and Plant and Soil Sciences in the Biology Bachelor of Science degree, effective spring 2022. The addition of the optional sub plans is part of a program restructure to provide students opportunities to deepen their knowledge and skills in specific areas of curricular emphasis and growth in the field of biology.

III. Request for Approval of Discontinued Academic Programs

College of Liberal Arts, School of Public Health, and the Graduate School (Twin Cities campus)—Discontinue the M.A. and graduate minor in Health Journalism and Communications

The College Liberal Arts, the School of Public Health, and the Graduate School on the Twin Cities campus request approval to discontinue the Master of Arts degree and graduate minor in Health Journalism and Communications, effective spring 2022. The request to discontinue is due to lack of enrollment. There are currently no current students pursuing this shared degree program or the corresponding minor.

College of Arts, Humanities and Social Sciences (Duluth campus)—Discontinue the graduate minor in Music

The College Arts, Humanities and Social Sciences on the Duluth Campus requests approval to discontinue the graduate minor in Music, effective spring 2022. There are currently no current students enrolled in this minor.

University of Minnesota Board of Regents Meeting
Mission Fulfillment Committee
December 16, 2021

Consent Report: Recommendation to Grant Tenure to External Hires

The Executive Vice President and Provost recommends Andrew Alleyne, Nisha Botchwey, and Mark Rosenberg for tenure and faculty rank as outlined below. The decision of the Board of Regents to confer tenure and rank for any individual faculty hire with tenure becomes effective on the first day of that faculty member's academic appointment at the University.

Andrew Alleyne, professor with tenure, Department of Mechanical Engineering, College of Science and Engineering

Dr. Alleyne's research focuses on modeling and control of complex dynamical systems. He has applied this approach to diverse applications ranging from refrigeration systems to additive manufacturing. He earned his Ph.D. from the University of California at Berkeley in 1994. Dr. Alleyne is currently the professor in the Department of Mechanical Science and Engineering at the University of Illinois at Urbana-Champaign. Andrew Alleyne has been named dean of the University of Minnesota's College of Science and Engineering, effective January 10, 2022.

Nisha Botchwey, professor with tenure, Hubert H. Humphrey School of Public Affairs

Dr. Botchwey has established an internationally recognized program of research on creating, maintaining, and increasing equitable access to healthy places for all people with a particular interest in youth as community change agents. She earned her Ph.D. in city and regional planning from the University of Pennsylvania in 2003. Dr. Botchwey joins the University of Minnesota from the Georgia Institute of Technology where she is an associate professor. Nisha Botchwey has been named dean of the University of Minnesota's Hubert H. Humphrey School of Public Affairs, effective January 10, 2022.

Mark Rosenberg, professor with tenure, Department of Medicine, Medical School

Dr. Rosenberg is a nationally and internationally renowned nephrologist specializing in the progression of chronic kidney disease. Dr. Rosenberg is past president of the American Society of Nephrology and he currently serves as vice dean for education in the Medical School. Dr. Rosenberg earned his M.D. from the University of Manitoba in 1975 and has spent most of his medical career at the University of Minnesota. In 2009, he moved into a leadership position at the Minneapolis Veterans Affairs Medical Center and relinquished tenure at the University as a result of the University's stipulation that a faculty member must hold a full-time position at the University to maintain tenure. Dr. Rosenberg returned to the University in a full-time capacity in 2012 after having

established critical connections with the VA Medical Center, one of the Medical School's most important affiliated institutions. The recommended conferral of tenure will reinstate Dr. Rosenberg's tenure at the University of Minnesota at the rank of professor.

University of Minnesota

Human Fetal Tissue Research

**Report to the Minnesota Legislature
2022**

University of Minnesota Human Fetal Tissue Research

Report of the Minnesota Legislature

As required by Minnesota Statute 137.47 which went into effect on July 1, 2017.

Submitted by:

Board of Regents

Prepared by:

The report was prepared by staff in the Office of Academic Clinical Affairs with the assistance of staff in the Office of the Vice President for Research at the University of Minnesota.

Report Preparation Costs:

Per the requirements set forth in Minnesota Statute 3.197, the cost to prepare this report was \$300.

Purpose:

During the 2017 Minnesota legislative session, a law was passed requiring the Board of Regents of the University of Minnesota to submit an annual report to the chairs and ranking minority members of the higher education policy and finance, health and human services, and human services policy and finance committees. The report is required to disclose specific information regarding university research projects which access donated human fetal tissue (reporting requirements noted below).

Background:

In February 2016, the University of Minnesota instituted new requirements for researchers accessing donated human fetal tissue. Oversight of human fetal tissue research became administered jointly by the Office of the Vice President of Research and the Vice President of the Academic Health Center.

Per the new requirements, researchers requesting to access human fetal tissue were required to apply for permission to conduct research using human fetal tissue from the Fetal Tissue Research Committee (FTR) prior to commencing their studies. Approval from the Institutional Review Board (IRB) continued to be required if the research project met the criteria established under federal law.

The Anatomy Bequest Program, a university anatomical donation program, became responsible for the acquisition, tracking and final disposition of the tissue.

In January 2018, the University of Minnesota updated the fetal tissue policies to reflect the new requirements associated with the enactment of Minnesota Statute 137.47. The revisions also broadened the scope of the policies to include educational uses, clarified the responsibilities of researchers, delineated newly required duties among the administrative units, and provided an opportunity to make housekeeping changes.

Report Requirements:

Per the requirements of Minnesota Statute 137.47, the following information must be included in this report: all fetal tissue research proposals submitted to the FTR or IRB, including any written narrative required under 137.47, subd.2; whether the research proposal involved aborted fetal tissue; action by the FTR or IRB on all fetal tissue research proposals, including whether the proposal was approved by the FTR or IRB; and a list of all new or ongoing fetal tissue research projects at the university. The list must include the date the project was approved by the FTR or IRB, the source of funding for the project, the goal or purpose of the project, whether the fetal tissue used is aborted fetal tissue or non-aborted fetal tissue, the source of the fetal tissue used, references to any publicly available information about the project, and references to any publications resulting from the project.

Per Minnesota State Statute 137.47, all required disclosures relating to University of Minnesota research projects which access donated human fetal tissue can be referenced below and/or in the attached table.

New Research Requests Submitted to the Fetal Tissue Research Committee:

There were no new research requests submitted to the FTR in 2021.

Previously Reported Research Update:

One research request which was approved by the FTR in 2020 has yet to begin. This research project was previously reported in the University's 2021 legislative report. The *Understanding Developmental Origins of Human Skull Base Tumors* research project (FTR Application Number 2002-37902B) was granted access to acquire human fetal tissue which was donated following an elective pregnancy termination. This research project has not yet begun. As such, no research expenses have been incurred nor has any fetal tissue been acquired.

As required under Minnesota law, the IRB reviewed the FTR's decision. The IRB concluded that the researcher and the FTR committee had considered all alternatives to the use of human fetal tissue.

The required reporting information regarding this study can be found in Table 1: *New or Ongoing University of Minnesota Research Projects Utilizing Donated Human Fetal Tissue*.

To date none of the protocols previously approved by the FTR have resulted in a publication. We are not aware of any references to other publicly available information about the projects.

FTR Application Number and Title	Application Approval Date	Research Goal	Funding Source	Tissue Procurement Source
2002-37902B-Understanding Developmental Origins of Human Skull Base Tumors	6/19/2020 (FTR and IRB)	Cancer occurs as a result of transformation from a previously normal cell. We use new technology (“single cell genomics”) that allows us to view all genes expressed in <i>individual</i> cells. Our goal is to compare the genes expressed in individual cells between human tumors and normal cells undergoing fetal development, so that we can map the origin of specific human cancers. Insights into the origin for cancer allows us to understand the underlying biology of cancer formation and provides a framework on how to prevent or treat these cancers in new ways.	No expenses have yet been incurred. This research will be privately funded once initiated.	None

Table 1: New or Ongoing University of Minnesota Research Projects Utilizing Donated Human Fetal Tissue



BOARD OF REGENTS DOCKET ITEM SUMMARY

Mission Fulfillment

December 16, 2021

AGENDA ITEM: Information Items

Review **Review + Action** **Action** **Discussion**

This is a report required by Board policy.

PRESENTERS: Rachel Croson, Executive Vice President and Provost

PURPOSE & KEY POINTS

University, Student, Faculty, and Staff Activities and Awards

The information items include select activities among faculty, staff, and students at the local, regional, national, and global level in the areas of teaching, research, outreach, and other academic achievements at the University.

**University of Minnesota Board of Regents Meeting
Mission Fulfillment Committee
December 16, 2021**

**Information Report: Report of University Student, Faculty,
and Staff Activities and Awards**

University Highlights

The University has received two grants totaling \$26 million from the National Institutes of Health for research on the impact of substance exposure during pregnancy on child brain and behavioral development. The Masonic Institute for the Developing Brain will serve as a key data collection, management, and analysis site for the HEALthy Brain and Child Development Study, a large, multi-institution project with twenty-five study sites across the country.

The Twin Cities campus has been named a top-producing Gilman Scholars institution by the US Department of State. The Department of State's Gilman Program seeks to make study abroad more accessible to and inclusive of American students by providing scholarships to outstanding undergraduates who, due to financial constraints, might not otherwise participate.

The University will house the Midwest Climate Adaptation Science Center, a five-year and \$4.5-million partnership to advance actionable science in response to climate crises in the Midwest. The center will be housed in the Institute on the Environment in collaboration with CFANS, Extension, and the Natural Resources Research Institute.

The Government Publications Library at the University Libraries was named the 2021 Federal Depository Library of the Year by the US Government Publishing Office for its consistency in striving to make government information more discoverable and accessible.

The Minnesota Landscape Arboretum was awarded a level IV accreditation by the ArbNet Arboretum Accreditation Program and the Morton Arboretum. The arboretum is in the top thirty of 418 arboreta accredited globally that meet the criteria for a level IV accreditation.

The School of Nursing received the Health Professions Higher Education Excellence in Diversity (HEED) Award from *INSIGHT Into Diversity Magazine* for the sixth year in a row. This award honors US nursing, medical, dental, pharmacy, osteopathic, veterinary, and other health schools and centers that demonstrate an outstanding commitment to diversity and inclusion, and was one of thirteen schools that received it this year.

The Medical School will be the site for an interdisciplinary team in the upper Midwest to host a spinal cord injury Center for Excellence. The grant, the Minnesota Spinal Cord Injury Model System, is one of fourteen projects to receive \$2.2 million over five years to research spinal cord injuries.

The Udall Center at the University of Minnesota Medical School was awarded a new \$11.3-million grant to continue its work in deep brain stimulation for Parkinson's disease from the National Institute for Neurological Disorders and Stroke.

The Medical School and the College of Biological Sciences have received \$8.5 million to expand on their work studying non-dividing cells that increase with age, as one of sixteen sites in the National Institutes of Health Common Fund's Cellular Senescence Network program.

A faculty research team in the Carlson School of Management partnered with the Minnesota Hospital Association to earn a nearly \$500,000 grant from the Robert Wood Johnson Foundation's Systems for Action research program.

The College of Education and Human Development and Minneapolis Public Schools announced a three-year partnership, with the support of the Minneapolis Foundation, that aims to turn research into reality to improve outcomes for students.

Faculty and Staff Awards and Activities

Lori Carrell, chancellor of the University of Minnesota Rochester; John Coleman, dean of the College of the Liberal Arts; and Maggie Tomas, director of the Graduate Business Career Center in the Carlson School of Management, were recognized as 2021 Notable Leaders in Higher Education by *Twin Cities Business* for quickly adapting, learning new technologies, and always prioritizing students.

Ben Winchester, Extension educator, has been awarded the Rural Research Renewal Prize. This prestigious national award is sponsored by Oklahoma State University, and is given annually to global leaders in rural renewal research, education, and engagement.

Karen Monsen, professor in the School of Nursing, was named the 2021 recipient of the American Medical Informatics Association's (AMIA) Virginia K. Saba Informatics Award. This award recognizes distinguished careers and significant impacts on the care of patients and the discipline of nursing.

Tadd Johnson, senior director of American Indian Tribal Nations Relations, was recognized by the Native American Finance Officers Association with a Lifetime Achievement Award.

Pamela Flash, director, Writing Across the Curriculum, and co-director, Center for Writing, was recognized as a Distinguished Fellow of the Association for Writing Across the Curriculum.

Jon Hallberg, an associate professor in the Medical School, was awarded an Emmy at the Upper Midwest Emmy Awards for his work on the production *Hippocrates Cafe: Reflections on the Pandemic* with TPT.

Raymond Christensen, an associate professor in the Medical School, was recognized by the Upper Midwest Emmy Awards for his participation in the *COVID-19 Vaccines: Finding Answers* special produced by WDSE in February 2021.

Mary Owen, assistant professor in the Medical School, received the Diversity and Inclusion Exemplary Leadership Award from the Association of American Medical Colleges.

Ana Núñez was appointed as chair-elect to the Association of American Medical Colleges Group on Diversity and Inclusion Steering Committee.

Mary Hermes, professor in the College of Education and Human Development, has been awarded \$374,918 for a Large Research Grant from the Spencer Foundation to support the five-year-long research project “Reclaiming Land and Languages Through Indigenous Community-Based Mobile Game Design.”

Rachel Hardeman, associate professor in the School of Public Health, has accepted an invitation to join the fourteen-member re-established Advisory Committee to the Director of the Centers for Disease Control and Prevention

Mark Thomas, a professor in the Medical School, and his team in the Center for Neural Circuits in Addictions have received a grant of \$100,000 from the National Institutes on Drug Abuse for further research into neurostimulation as a potential treatment for addiction.

Dante Cicchetti, professor in the College of Education and Human Development, received the 2021 Bowlby-Ainsworth Award for his research on the importance of early experience in development and his role in securing a place for attachment theory in developmental psychopathology from the Center for Mental Health Promotion.

Ferenc Toth and Casey Johnson, assistant professors in the College of Veterinary Medicine, will lead and co-investigate parallel studies. Toth received a one-year award for \$437,000 to better understand juvenile osteochondritis dissecans. Johnson received a one-year award for \$541,000 to detect earlier a hip disorder called osteonecrosis of the femoral head that is often the precursor to a hip replacement.

John Loegering, professor at the University of Minnesota Crookston, was recognized with the Wildlife Society's Publication Award for the journal article "Population Trends in Vermivora Warblers Are Linked to Strong Migratory Connectivity."

Student Awards and Activities

Tegan Carr, third-year medical school student, was awarded a \$5,000 Association of American Medical Colleges 2021 Herbert W. Nickens Student Scholarship Award.